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ORIGINAL ARTICLES

A Radiographic Method of Evaluating Hip Flexion Contractures.
Leon M. Rothman, M.D.; Otto Deutschberger, M.D.; Milton Lowenthal, M.D., and Joseph M. Breuer, M.A. 325

Further Studies of Brief Isometric Exercises.
W. T. Liberson, M.D., Ph.D., and M. Maxim Asa, M.S. 330

Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration. II: Expiration. Alma J. Murphy, Ph.D.; George H. Koepke, M.D.; Edwin M. Smith, M.D., and David G. Dickinson, M.D. 337

A Reaction of Degeneration Scanner.
Arthur J. Heather, M.D., and Martin A. Apostolico, Jr., B.S. 343

William Schmidt Testimonial 347

Annual Reports: American Congress of Physical Medicine and Rehabilitation; American Academy of Physical Medicine and Rehabilitation, and American Registry of Physical Therapists 348

Abstracts 355

Book Reviews 359

Medical News 364

Editor of the Month
ARTHUR C. JONES, M.D.
Portland, Oregon

37th ANNUAL SESSION • MINNEAPOLIS • Aug. 30-Sept. 4, 1959

Archives of Physical Medicine and Rehabilitation

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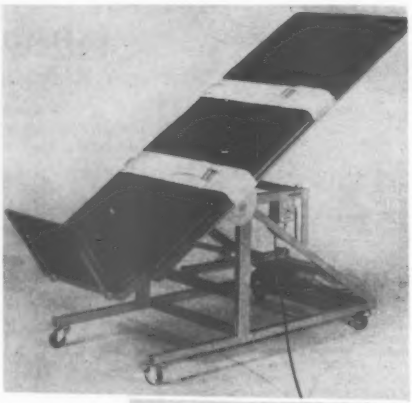

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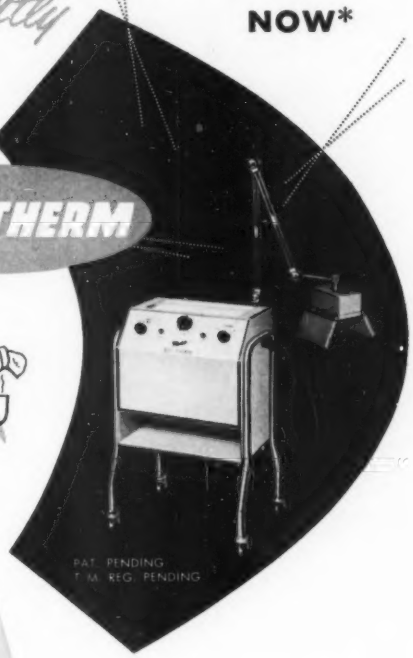

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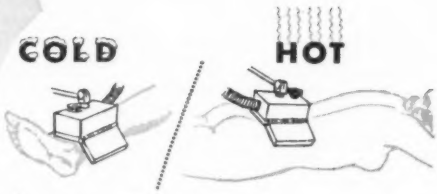

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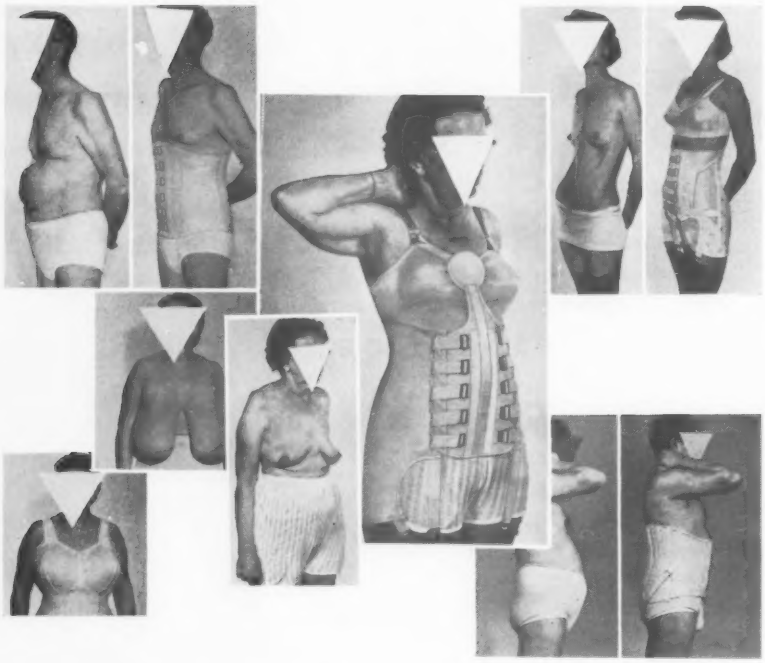

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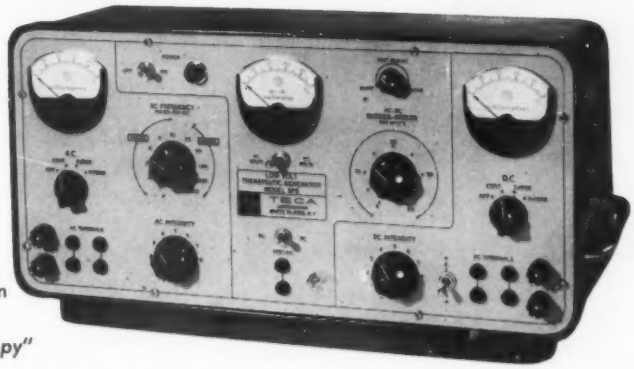

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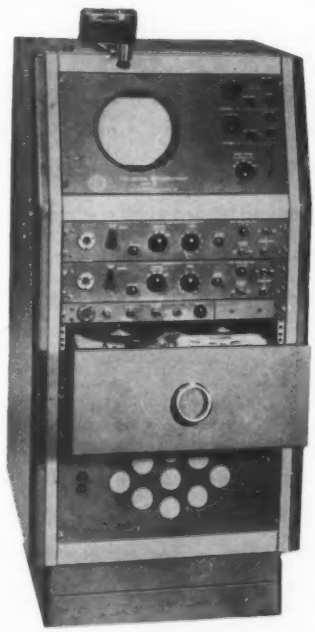

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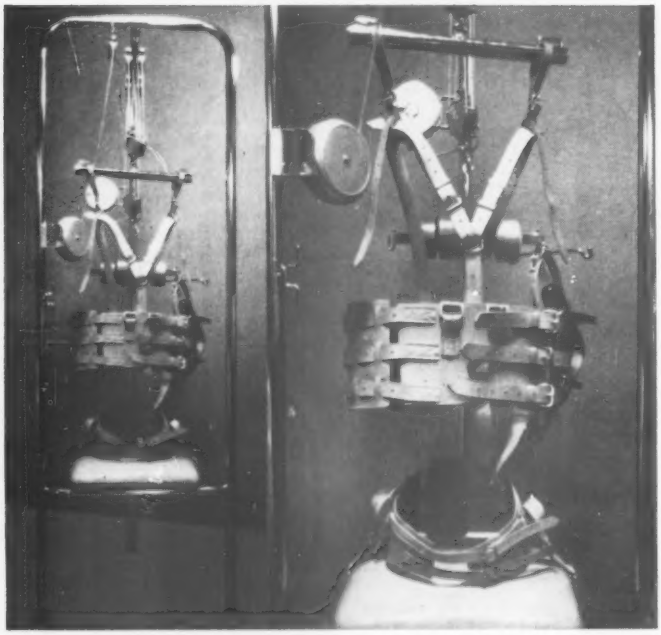

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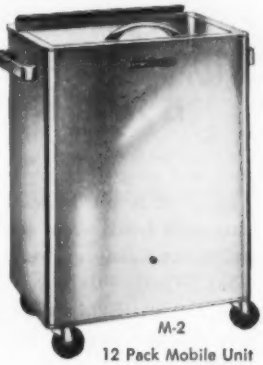

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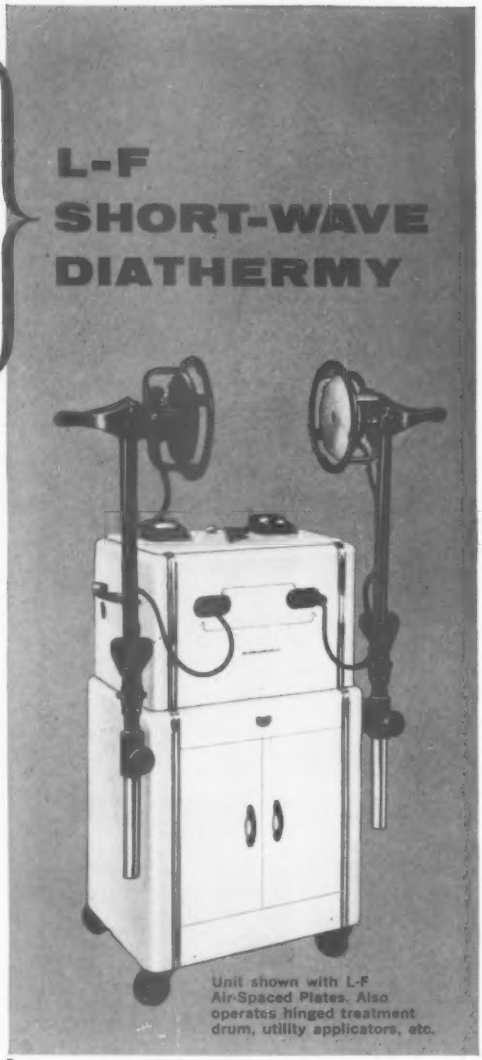

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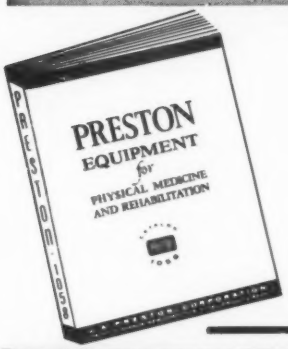

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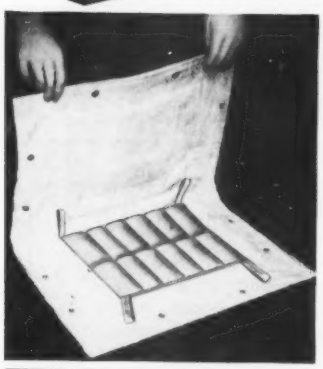

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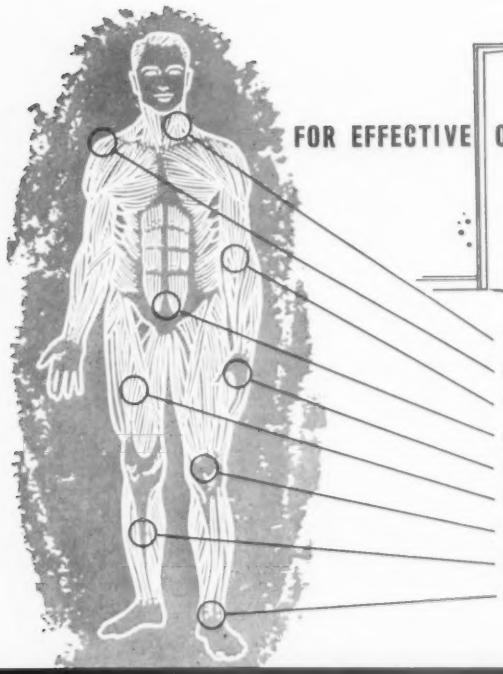

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A Radiographic Method of Evaluating Hip Flexion Contractures

Leon M. Rothman, M.D.
Otto Deutschberger, M.D.
Milton Lowenthal, M.D.
and
Joseph M. Breuer, M.A.
New York

● Flexion contracture at the hip joint is found as a complication in a wide variety of physical conditions encountered on a rehabilitation service. This complication is not an infrequent factor limiting the ambulation goals of the rehabilitation patient. The usual methods of estimating the presence and degree of hip flexion contracture by the eye alone or even with a goniometer are subject to considerable error. A technic of mensuration utilizing a lateral x-ray projection has yielded reproducible measurements with a high degree of accuracy. Fixed bony landmarks give origin to lines which when extended form an angle. The measurement of this angle gives an absolute figure which represents the relationship between the bony pelvis and the femur, and permits objective evaluation of the therapeutic effectiveness in dealing with limitation of hip extension.

Goniometry is the customary method used to measure joint range of motion and, in the main, is quite useful clinically. There are, however, inherent difficulties in the use of the goniometer which make this method somewhat less than scientifically accurate.

The inaccuracies inherent in goniometric mensuration at the hip are due to a number of factors, such as the subjectivity of the method and the difficulty in immobilizing the lumbar spine during mensuration, and hence being unable to measure motion only at the coxal articulation.

Clinically, maximal extension of the hip may be measured with the patient in the prone or side-lying position.[1, 2] In these positions, however, it is difficult to control an increase in lumbar lordosis which might conceal a slight degree of flexion contracture. The Thomas maneuver overcomes this objection to some extent. In this method the patient is examined in the supine position and the opposite thigh is flexed maximally in order to flatten the lumbar spine. More recently a method has been described which measures the range of motion between the femur and the innominate bone.[3] This latter method appears to overcome successfully the masking effect of increased lumbar lordosis in measuring extension of the hip joint.

Despite the inaccuracies of goniometry, it remains a practical and informative procedure for clinical evaluation. However, when more precise information was required in a study undertaken to evaluate the effect of various types of therapy on hip flexion contractures, it became necessary to develop a method of measuring maximum extension at the hip joint which would be exact, objective, reproducible, and sensitive enough to measure small changes. The radiographic technic to be described appears to be a satisfactory solution to this problem.

Principle of Measuring Maximal Extension of Hip

Loss of extension at the hip is compensated for by an increase in lordosis of the lumbar spine, and a slightly diminished extension may be easily concealed by an unnoticed change in posture. Therefore, in order to obtain exact values of hip joint extension, the position of the femur must be measured against a definite and invariable line of reference.

We chose the true conjugate of the pelvis as this line of reference. This line can easily be determined on a lateral radiograph of the pelvis and is drawn as a straight connection between the promontory of the sacrum and the symphysis pubis in a way similar to that for pelvi-

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Associate, Department of Physical Medicine and Rehabilitation, New York Medical College, New York City; Assistant Visiting Physician, Department of Physical Medicine and Rehabilitation, Bird S. Coler Hospital, Welfare Island, N. Y.

Assistant Clinical Professor in Radiology, New York Medical College, New York City; Executive Director, X-Ray Department, Bird S. Coler Hospital, Welfare Island, N. Y.

Associate Professor, Department of Physical Medicine and Rehabilitation, New York Medical College, New York City; Visiting Physician, Department of Physical Medicine and Rehabilitation, Bird S. Coler Hospital, Welfare Island, N. Y.

Chief Physical Therapist, Bird S. Coler Hospital, Welfare Island, N. Y.

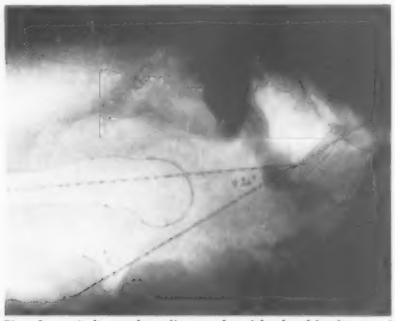

Fig. 1 — A lateral radiograph with the hip in maximal extension showing the angle between the pelvic reference line (true conjugate) and the long axis of the femur.

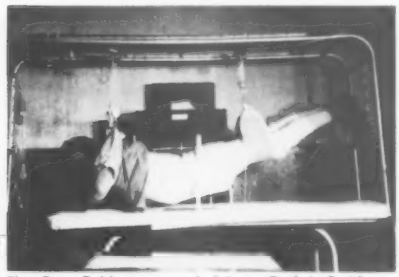

Fig. 2 — Subject suspended in a Guthrie-Smith suspension frame. Gravity is utilized as the force for obtaining maximal hip extension.

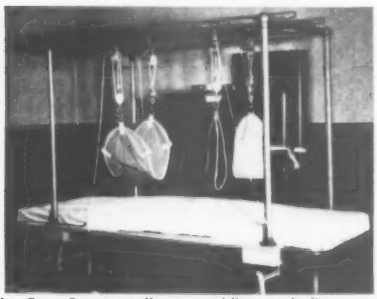

Fig. 3 — Frame, pulley assemblies, and slings used to suspend subjects. Fabricated of ¾-inch plywood for base and 1½-inch galvanized pipe.

metry. A second line indicating the position of the femur is drawn through the long axis of the femoral shaft. This line and the line in the direction of the true conjugate, when intersecting each other, form an angle which indicates the degree of flexion or extension of the hip joint (fig. 1).

In order to measure maximal extension of the hip joint, it becomes imperative to assure maximal extension of the patient's hip. We felt that gravity should be used as a force to obtain maximal extension. Although this force varies with the weight of the human body, with the elasticity of its structures, and the tone of its muscles, these factors are inherent for the particular individual under investigation. Utilizing gravity as a force for hip extension makes it possible to produce values which are comparable when obtained from the same patient at different times, such as at the beginning and the end of treatment. Only examina-

tions performed with such a method would permit correct clinical evaluation. On the other hand, it is expected that the full extension of a hip produced by gravity will show a physiological range and will vary in different individuals with their weight, age, sex, and constitutional factors.

Technic of Measuring Maximal Extension of Hip

Patients without respiratory or circulatory difficulties can be placed on an ordinary hospital stretcher in a prone position. The stretcher is positioned in front of an upright Bucky grid with a 14 by 17-inch film cassette in its tray.

For supporting the pulleys necessary in this method we required some overhead support and originally used a Guthrie-Smith suspension frame for this purpose (fig. 2). A more satisfactory frame for suspending the patient was made of 1½-inch galvanized pipe fitted to a plywood platform which easily is slid on to a stretcher and remains secure (fig. 3).

Each lower extremity is elevated independently by a sling which supports the lower end of the femur. The slings are raised over pulleys until the pelvis follows the pull and is lifted off the table. Any further elevation will lift the femur together with the pelvis, and gravity assures maximal extension of the hip. The degree of elevation of the pelvis does not influence the angle of the hip extension any longer, since both the axis of the femur as well as the pelvic reference line move together as a rigid system as soon as maximal extension is reached. The patient then rests on his chest wall, which may make costal breathing somewhat uncomfortable. Some lessening of this discomfort was noted when the chest wall itself was supported in a broad sling.

For elderly patients, particularly for those suffering from a chronic respiratory or circulatory disturbance, a simple apparatus for supporting the shoulder girdle and removing the pressure from the patient's thorax was devised. Thus, the patient forms a "hammock" supported in a prone position underneath the shoulders and underneath each femur. Both slings elevating the femurs are kept parallel in order to avoid abduction of the hips. In this position, with the chest wall removed from the table, the patient can breathe freely. Obviously, elevation above the stretcher should not amount to more than a few inches so that the patient will not experience any sensation of fear. In addition, the patient should be in muscular relaxation.

The pelvic region and the upper femur are centered over the Bucky area with the hip joint to be investigated closer to the film. The center ray is placed over the anterior-superior iliac spine, which is in an anteroposterior direction about half way between the symphysis and the promontory. Since the femur lies practically parallel to the film, some obliquity of the rays will not result in an appreciable or disturbing distortion. In addition, the film-target distance is kept at 40 inches in order to avoid faulty projection.

Before exposing the film, particular care must be taken to exclude any rotation of the body which would change the direction of the pelvic line of reference. For this reason, the distance of the anterior-superior iliac spine on each side must be measured from the table top and the distances must be kept equal. This is accomplished by lifting or lowering slightly the suspension sling on one or the other thigh. For measuring the extension of one hip joint only a single film is needed. Once the technic has been mastered, a patient can be properly positioned and a film exposed in less than 5 minutes.

The measurement is performed on the dry film as follows: one straight line is drawn through the promontory and the center of the symphysis. The other straight line runs through the middle of the femoral shaft. For greater accuracy, it is advisable to measure the hip which is closer to the film. This is indicated by the lesser magnification and the sharper contour of the femoral shaft. Sometimes the angle formed by the two lines may be so acute that their intersection may be projected beyond the

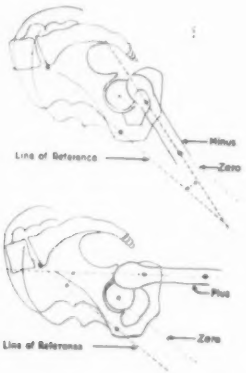

Fig. 4 — Diagram demonstrating method of mensuration. Line of reference is the prolongation of the true conjugate. Zero Line is parallel to line of reference. Upper figure shows axis of femur swinging toward line of reference (minus [−] extension). Lower figure shows axis of femur swinging away from line of reference (plus [+] extension).

confinements of the film. In these cases, one of the lines has to be shifted in a parallel manner toward the second line until these intersections meet within the boundaries of the film. The angle, then, is determined by means of a protractor (fig. 4).

Discussion and Terminology

The lines of reference, although useful in this technic, are arbitrary in regard to the anatomical requirements for the definition of flexion or extension of the hip. Clinically, the most useful method of recording the degree of joint motion utilizes the anatomic position as the starting position, or 0 degrees.

Thus, in the anatomic position the femur does not form an angle of 0 degrees with the plane of the true conjugate, and any angle measured from the base line must also be considered arbitrary in regard to degrees of anatomical flexion or extension of the hip. The values obtained by this method do not express the clinical aspect of the examined hip joint. When maximal extension of the hip becomes limited to a degree whereby the axis of the femoral shaft runs parallel to the true conjugate, we refer to this as "zero extension," which must not be taken as an anatomic definition. In the same manner, any such angle in which the femur swings from the line of reference has been termed as plus (+) extension, and any angle in which the femur swings toward the line of reference has been designated as minus (−) extension, indicating a more severe loss of extension of the hip.

The reliability and reproducibility of the method was checked by measuring several subjects on more than one occasion. The measurements for a given subject varied by no more than 1-2 degrees.

During the process of elaboration of the technic described, 11 normal subjects were examined. The values obtained for maximal extension of the hip are noted in table 1, along with the age and sex of each subject. Although valid conclusions could not be drawn from the small number of subjects tested, the figures obtained suggest the probable normal range of hip joint extension as defined by this method.

Some suggested applications of this method are: (1) The evaluation of therapy in a particular patient as a guide to further therapeutic planning, such as surgery; (2) clinical investigation concerning the value of any particular form of therapy; (3) the establishment of normal variations with respect to such factors as age, sex, and various constitutional factors.

Table 1: Values for Maximal Extension of Hip Obtained in 11 Normal Subjects

Sex	Age	Maximum Extension of Hip
Female	24	+30°
Female	26	+42°
Female	32	+43°
Male	23	+26°
Male	24	+44°
Male	26	+28°
Male	28	+27°
Male	30	+27°
Male	42	+29°
Male	54	+20°
Male	60	+22°

Summary

A relatively simple radiographic technic for measuring the maximum extension of the hip joint has been presented. This method is highly accurate, objective, and readily reproducible. It is sufficiently sensitive to measure small changes in extension. It is not suggested that radiographic mensuration replace goniometric studies, but this method is designed to provide the investigator with a reliable method of mensuration.

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Further Studies of Brief Isometric Exercises

W. T. Liberson, M.D., Ph.D.
Hines, Ill.
and
M. Maxim Asa, M.S.
Rocky Hill, Conn.

● Effectiveness of daily brief (6 second) isometric exercises as compared with the DeLorme exercises was investigated in 26 normal individuals (hypothenar eminence was exercised). It was found that these exercises produce increase in strength and endurance more rapidly than the DeLorme type of exercise. Additional increase in strength and particularly endurance was found, however, when 6 second brief isometric exercises were repeated several times a day. No contralateral effects are observed. The results were confirmed by a direct recording of the muscle contractions produced by electrical stimuli prior to and after training. Repeated brief isometric exercises were applied to patients with lower motor neuron lesions with satisfactory results. The significance of these findings is discussed.

A few years ago two German investigators, Hettinger and Müller[1], disclosed that in normal subjects a muscle hypertrophy and corresponding increase in strength could be achieved by very brief tonic exercises of the order of 2-5 seconds, performed only once a day. No better results were obtained by repeating these exercises several times a day or by increasing their total duration. This was a very intriguing observation for at least two reasons. First, tonic exercises usually had been considered as unfavorable for muscle strengthening in view of the possible interference with the blood circulation; second, the duration of only a few seconds of muscle contraction performed only once a day seems to contradict the very concept of an exercise. However, the importance of this observation led several physiatrists to repeat the study of Hettinger and Müller, not only in normal individuals but also in patients afflicted with a variety of pathological conditions resulting in muscle weakness. Among these clinical investigations, the one by Rose and his associates[2] was the most extensive. These authors showed that if a quadriceps is exercised by lifting a weight and maintaining it with the maximum extension of the lower leg for a total duration of 5 seconds a day, the resulting increase in muscle strength is comparable to that which would have been expected from the traditional De Lorme exercise.[3]

However, the work of Rose and his associates revealed some discrepancies when compared with the results of Hettinger and Müller. First, Rose's group did not find any significant hypertrophy in muscles submitted to brief isometric exercises while Hettinger and Müller did; second, the increase in strength was as pronounced in the symmetrical, unexercised quadriceps as in the exercised quadriceps. This suggested the possibility that in the work of Rose and his associates the increase of muscle strength was due to the improvement of the neural mechanism of muscular efficiency rather than to the actual effect on the muscle tissue.

The initial research of Hettinger and Müller was carried out on a very small number of subjects and Rose and his associates did not make a quantitative comparison between the isometric and isotonic exercises. This is why we thought it appropriate to submit the problem to further studies. Some of our findings have been partially reported elsewhere.[4]

Method

Exercised Muscles. The muscles of the hypothenar eminence (with abductor digiti quinti as its main component) were chosen because of a relatively little involvement of these muscles in the activities of daily living. One may, therefore, assume that whatever increase in strength is observed during the training is due to the exercise conducted in the laboratory and not to any uncontrolled activity. The

Read at the Thirty-sixth Annual Session of the American Congress of Physical Medicine and Rehabilitation, Philadelphia, August 28, 1958.

Formerly, Chief, Department of Physical Medicine and Rehabilitation, State of Connecticut Veterans Home and Hospital, Rocky Hill, Conn.; now, Chief, Department of Physical Medicine and Rehabilitation, Hines VA Hospital.

Physical Medicine Research Associate, State of Connecticut Veterans Home and Hospital.

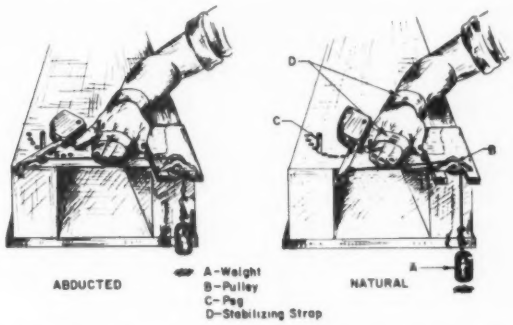

Fig. 1 — Diagram of the apparatus used to study isotonic exercises.

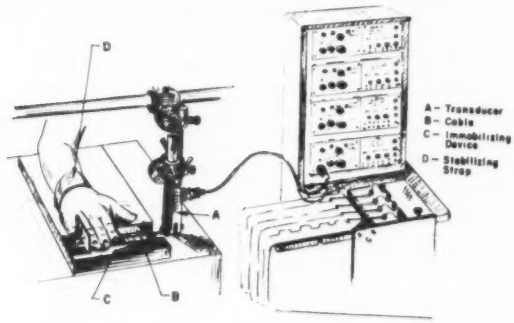

Fig. 2 — Diagram of the apparatus used to study isometric exercises.

exercises were conducted according to either the DeLorme technic, or isometrically.

Isotonic Exercises. The subject was asked to push a lever which raised a measured weight (fig. 1). The pushing movement was performed through the full range of motion (limited by a movable peg). Both the 1 RM (maximum weight for only one repetition) and 10 RM were determined weekly. Each subject performed exercises four times a week; each day he was asked to achieve ten exercises with 50 per cent of the 10 RM, ten with 75 per cent of the 10 RM, and ten with 100 per cent of the 10 RM. The movements were executed at a rate of 10 to 15 per minute. The load was increased each week according to the usual schedule.[3]

Isometric Exercises. Figure 2 illustrates the apparatus used for isometric exercises. The subject was asked to exert a maximal pull on a cord attached to an isometric strain gauge myograph (Grass) and to maintain it for 6 seconds.

Subjects Chosen

Twenty-six normal subjects were studied. At first we divided our subjects into two groups of thirteen each (ages varying from 20 to 45 years). Members of the first group (A) exercised the hypothenar eminence according to the method of DeLorme. The second group was divided into two subgroups, B and C, matched as to the degree of their improvement. Group B (control) comprised seven subjects who continued with the same isometric exercises as before (once daily) until the end of the study (three additional weeks). Group C consisted of six subjects who continued the same type of exercise as before, but instead of performing a single daily contraction for 6 seconds, each subject repeated the exercise 20 times during each session. Group A was also divided into two subgroups since the age range for this group was different from that of the other groups. The two subgroups were as follows: A_1—six subjects with the same age dis-

tribution as Groups B and C (20 to 30 years), and A_2—seven subjects in the age range from 30 to 45 years.

Tests and Measurements

Muscle Strength and Endurance Testing. Each subject was tested at the beginning of the experiment for: (1) maximal isometric contraction maintained for 6 seconds (recorded with the myograph); (2) the 1 RM value; (3) the 10 RM value. At the end of the experiment, these three determinations were made again; in addition, each subject was asked to maintain a pull on the isometric myograph cord with his hypothenar muscles until exhaustion. The time elapsed from the beginning of the pull until the moment when the myograph indicated 50 per cent of the initial amplitude was taken as the index of endurance.

Contralateral Influence of Training. A determination of the 1 RM and 10 RM on the unexercised hand was made on thirteen subjects who had exercised according to the DeLorme method. Also, the maximal muscle tension was determined on the unexercised hand of five subjects from Group B who had trained with brief isometric exercises. The remaining two subjects could not be tested.

Measure of the Hypertrophy. Attempts to reveal muscle hypertrophy were done by: (1) measuring the circumference at the most prominent point of the muscle belly; (2) measuring the maximum thickness of the muscle belly with skin calipers; (3) measuring the area of the muscle as determined by x-ray photography and planimetry. These tests were carried out before and after training.

Electrical Testing. Prior to the exercise period and after three months of training, all the subjects were submitted to a recording of an electrically induced twitch. The twitch of the abductor digiti quinti could be recorded easily with the tip of the strain gauge myograph pressing against the muscle belly. This padded tip being connected to a condensor discharge stimulator, the muscle contraction was recorded in the same region where the muscle was stimulated. The

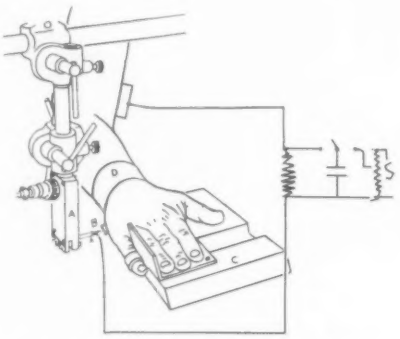

Fig. 3 — Diagram of the apparatus used for the electrical stimulation with a simultaneous recording of the electrically induced twitch. *A*, strain gauge myograph; *B*, electrode; *C* and *D* are used for immobilization of the hands; *S*, stimulator.

amplitudes of contraction were determined for different pulse durations (between 10 and 40 milliseconds), voltages (the highest voltage was 380 volts), and the pressures of the myograph tip upon the muscle (between 1 and 3 kg.) (fig 3).

Results

Increase of Maximum Muscle Strength and Endurance. Figure 4 shows that increase of muscle strength, as measured by 1 RM for isotonic exercise and by maximum pull in grams for isometric exercise, differed significantly among the investigated groups. Thus, Group A_1 shows an increase of 103 per cent; Group B, an increase of 174 per cent and Group C, an increase of 203 per cent at the end of the training period. Also, the plateau was reached slightly earlier with individuals subjected to isometric exercises as compared with those with isotonic exercises.

In order to carry further the comparative studies of the increase in muscle strength, the subjects of all three groups were pre- and posttested under both isotonic and isometric conditions. Group A_1 of the comparative age showed a lower increase in efficiency in both tests than

Table 1: Mean Per Cent Increase in Muscle Strength

Groups	1 RM (DeLorme) Test	Strain Gauge Test
A_1	103%	112%
A_2	123%	110%
B	130%	174%
C	150%	203%

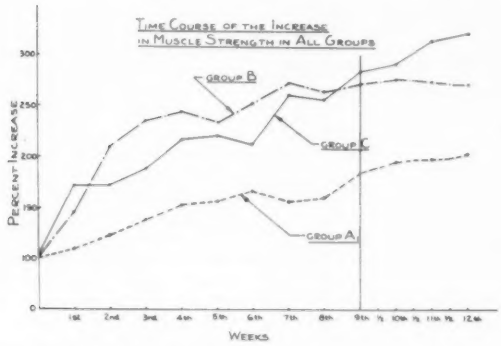

Fig. 4 — Diagram which illustrates the time course of the increase of maximum muscle strength in all groups, during the time of the experiment. After nine weeks the curve corresponding to Group C represents the amplitude of the first contraction of the twenty repetitions performed daily.

Groups B and C, the latter showing the best performance (table 1). These differences were all statistically significant at the level of probability of 2-5 per cent. This seems to be all the more remarkable as, despite the fact that the subjects of Groups B and C were not trained with the DeLorme exercise, they achieved a better performance in this type of exercise than the subjects of Group A who were continually trained by the DeLorme technic.

The most pronounced difference among the groups was seen in relation to endurance, as shown by figure 5. Those in Group C did best, while those in Group A performed poorly. It will be remembered that the test of endurance was not performed prior to exercise in order not to add additional stress to the exercised muscles. In contradistinction to the findings of Rose and his associates,[2] no significant training effects on the contralateral (unexercised) hand were found with either the isotonic or isometric exercise.

Hypertrophy. Table 2 shows the results of our attempts to find hypertrophy after isotonic and isometric exercises. It will be seen that the changes were minimal and not statistically significant. The maximum mean individual increase of caliper measurements was found for Group C. As to the tape measurements, it was the highest for Group A_1 and higher for Group C than B.

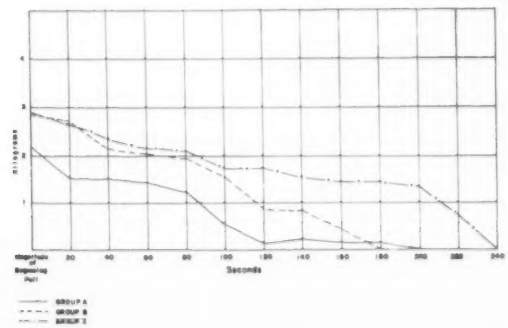

Fig. 5 — Diagram representing the average endurance curves. From left to right the curves represent the amplitude of maximal contraction which decreases slowly due to fatigue.

Table 2: Hypertrophy – Mean Individual Increase in Tape and Caliper Measurements

Groups	Tape Circumference		Caliper Measurement	
	Mm.	Per Cent	Mm.	Per Cent
A_1	13	6.9	1.6	8.1
A_2	13	5.5	1.3	6.5
B	10	4.6	1.3	7.3
C	10.5	5.2	1.8	8.9

Electrical Testing. The electrical testing proved, however, unequivocally, the direct effects of the isometric exercises on the muscle tissue itself, because the results of this test showed an increase in the amplitude of elicited twitches after a period of isometric exercises. In order to evaluate these results we had to match our subjects, as there was a considerable variability in the amplitude of recorded muscle twitches before the training period. We could, however, find three subjects in Group A, four in Group B, and four in Group C who had comparable initial performance as to the effects of electrical stimulation. The posttests in these subjects indicated increase in twitch amplitude of 53 per cent for the isotonic exercises, 42 per cent for single isometric exercises, and 78 per cent for repeated isometric exercises. Here again, therefore, the repeated brief maximum isometric exercises proved to be the most efficacious. It is worth mentioning, however, that the percentages of the increase of performance were below those found for voluntary contractions and, therefore, the total improvement may probably include extramuscular factors as well.

Patients

Only a limited number of patients have been investigated so far. Extensive studies were made, however, on a few muscles of six patients—two patients with poliomyelitis, one with myotonia dystrophica, one with progressive spinal atrophy, one with rheumatoid arthritis, and one with toxic polyneuritis. Brief histories of these patients follow:

Case 1. A 24-year-old man was admitted to this hospital in September, 1955, recovering from an acute poliomyelitis (onset June, 1955) with severe extensive involvement of both legs, both arms, shoulder girdles, and abdominal and paravertebral muscles. At the beginning of the repetitive isometric brief exercises (January 2, 1958) his left biceps was hardly functional despite conventional therapy. He could flex his elbow against gravity only 30 degrees (from 180 to 150 degrees flexion); he could not lift any weight. The muscle strength at 170 degree flexion measured 875 gm. (with isometric myograph). At the end of four months of treatment with isometric exercises his muscle strength increased to 2,977 gm. and he could lift a weight of 500 gm. three times through full range of motion.

Case 2. A 27-year-old man was admitted October, 1957, recovering from an acute poliomyelitis (onset August, 1957). Both legs were involved, the right more severely than the left. Before the beginning of isometric exercises, the patient was treated by a full program of conventional muscle re-education. At the beginning of his isometric treatments (January, 1958), which were applied to the right quadriceps, the muscle strength measured 2,025 gm. (at 60 degree flexion). After three months of daily treatments (six times, 6 seconds each time with 20-second intervals) the strength measured 8,500 gm. At the beginning of the isometric treatments he could extend his lower leg from 90 to 100 degrees, and at the end he could extend his leg practically through full range of motion.

Case 3. A 42-year-old man was admitted to the hospital November, 1957, with a history of generalized weakness of at least two years' duration. The diagnostic studies, including electromyography, revealed a typical picture of myotonia dystrophica. The pull of the triceps surae muscle (at a 90 degree angle) was found to be 5,039 gm. on the left and 5,972 gm. on the right. The patient could not elevate or support his body weight while on the balls of his feet before the beginning of the isometric treatments. Three months later, after a program of daily exercises on the right side (six repetitions of 6-second maximal isometric contractions) the strength of the triceps increased to 18,662 gm., while the opposite unexercised triceps remained at the initial level of strength (5,225 gm.). Then the treatments started on the left side, and after eight weeks of exercise the muscle strength reached 13,883 gm. He started to elevate his body on the balls of his feet after six months of exercises.

Case 4. A 31-year-old man was admitted in April, 1958, with a history of progressive weakness of all four extremities of one year's duration. Diagnostic studies, including electromyography, revealed progressive spinal atrophy. The muscles selected for research investigation were those of the hypothenar eminence of the hand (abductor digiti quinti). Tested with a myograph, his abductor's

strength measured 180 gm. at the beginning of the isometric exercise program. After six weeks of daily exercises (six repetitions of 6-second isometric contraction) his muscle strength increased to 450 gm. However, the functional gain was minimal.

Case 5. A 33-year-old man was admitted to this hospital in May, 1957, with a diagnosis of rheumatoid arthritis, with a history of pain in his knees and wrist dating back to 1948. The conventional program was administered until April, 1958, when isometric exercises to his quadriceps muscles on both legs were started. Prior to the beginning of the isometric treatment, his left quadriceps showed a pull of 14,930 gm. and his right quadriceps 20,528 gm. After two months of daily exercise treatments, which consisted of six repetitions of 6 seconds' maximum isometric contractions at a 60 degree angle of knee flexion, his left quadriceps measured 25,754 gm. and his right 30,606 gm.

Case 6. A 64-year-old man was admitted to this hospital in April, 1958, complaining of weakness of both arms and legs, with a diagnosis of chronic ethylism and toxic polyneuritis. Diagnostic tests showed increased chronaxies and fibrillations in peroneal and anterior tibial muscles. Repeated isometric exercise treatments were started to the quadriceps. The initial test of June 3, 1958, showed the patient able to exert a pull of 16,796 gm. on the left side and 20,528 gm. on the right. After seven weeks of daily exercises consisting of six repetitions of 6 seconds' maximum isometric contractions at 60 degree angle of flexion, (body at a semireclined position), a similar strength test showed a pull of 25,007 gm. on the left leg and 27,993 gm. on the right.

Discussion

The foregoing data confirm the results of Hettinger and Müller and of Rose and his co-workers as to the efficacy of the brief isometric exercises. However, in contradistinction to the claims of Hettinger and Müller, it shows that repeated maximum isometric exercises are more efficient than single ones (daily). The present study also failed to confirm the results of Rose and his associates concerning the transfer of the effects of training to the contralateral unexercised muscle at least for the muscles of the hypothenar eminence. Also in contradistinction to the data of Hettinger and Müller, the present study showed only a slight hypertrophy of the exercised muscles which was found only after repeated exercises and was not statistically significant. However, electrical testing proved the presence of direct effect of brief isometric exercises on the muscles, at least to a certain extent.

The efficacy of brief exercises is puzzling. It seems that one should consider several factors in the search for an explanation: (1) In our study, the subjects were asked each time to make a maximal possible effort rather than given predetermined increments in resistance. (2) The muscles were exercised in a standard position with the muscle at its resting level. It was found by many investigators that the muscle can generate maximum tension when it is not allowed to shorten and when its length is near the resting level.[5, 6] Recent study of the gamma system brought additional information on this question as an excessive stretching may inhibit muscle power. It is clear that during isotonic exercises part of the exercise is done while the muscle may have an unfavorable length; during this time the exercise does not contribute to the training effects. It is, therefore, probable that isometric exercises, conducted according to the technic used during this study, offer a greater possibility for maximal muscle activity than the conventional exercises. Additional research is needed to test this hypothesis and to find for each muscle the optimal positions for brief isometric exercises.

Conclusions

This study confirmed the efficacy of brief isometric exercises in normal individuals and in patients. However, it showed that repeated maximal brief isometric exercises are more efficacious than single ones (performed only once a day). The effect of repeated exercises are particularly noticeable as far as endurance is concerned. There is an increase in the amplitude of the electrically induced muscle twitches after a training period with brief isometric exercises. This proves the presence of direct effect of the exercises upon the muscle itself. Therapeutic effects of repeated maximal brief isometric exercises were found in a variety of pathological conditions.

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Electromyography - Electrodiagnosis Meeting

The American Association of Electromyography and Electrodiagnosis will hold its annual meeting at the Mayo Clinic, Rochester, Minnesota, August 29-30, 1959.

All those interested, please communicate with

EDWARD LAMBERT, M.D.

Program Chairman

THE MAYO CLINIC, ROCHESTER, MINNESOTA

Sequence of Action of the Diaphragm and Intercostal Muscles During Respiration. II: Expiration

Alma J. Murphy, Ph.D.
George H. Koepke, M.D.
Edwin M. Smith, M.D.
and
David G. Dickinson, M.D.
Ann Arbor, Mich.

● The pattern of activity of the diaphragm and intercostal muscles during passive and forced expiration of measured volumes of air was studied by means of the multiple-channel electromyograph using the needle electrode technic. The point of onset or cessation of the muscle action potentials was determined with reference to the onset of expiratory air flow. When a forced expiration is initiated from a deep inspiration, intercostal activity occurs consistently and is recruited sequentially from the eleventh intercostal upward, while activity in the diaphragm stops at the onset of expiration. However, the smaller the volume of air in the lungs at the beginning for a forced expiration the more likely that the intercostals will become active simultaneously with the onset of the expiration. During passive expiration, intercostal and diaphragmatic inspiratory activity tapers off into expiration, suggesting a braking action by these muscles to oppose the elastic forces of the lung.

This paper is based on an electromyographic investigation of activity in the diaphragm and intercostal muscles during expiration, and is a continuation of a study of the pattern of activity in these muscles throughout respiration. In a previous report on inspiration[1], it was shown that during a deep breath the pattern begins with activity in the diaphragm and continues through the intercostals in a sequential manner from the upper through the lower intercostals. As increasingly deeper breaths are taken, progressively lower intercostals are recruited. During quiet breathing, only the diaphragm and first intercostal muscles are consistently active.

The present study was made to determine the action of these muscles during forced and passive expiration. The emphasis was placed on investigation of patterns of muscle recruitment and on the relationship between the onset of electrical activity and breath size.

Method

The method of recording diaphragmatic and intercostal activity and relating it to lung volume was similar to that used in the previous study of these muscles acting during inspiration.[1] Electrical representations of spirometer movement and of muscle activity were recorded simultaneously by photographing the oscilloscope screens of a synchronized multiple-channel electromyograph. Needle electrodes were used to record activity in the odd-numbered intercostal muscles and in the diaphragm near its attachment to the twelfth rib. Studies were made of 11 normal men placed in a supine position. Observations were made during passive expiration following inspirations ranging in size from 5 to 80 per cent of the predicted vital capacity (PVC) and during forced expiration following breaths varying from 0 to 70 per cent of PVC. The point of onset or cessation of electrical activity was determined with reference to the onset of expiration.

To distinguish accurately between diaphragmatic and eleventh intercostal activity, simultaneous recordings were made from the two muscles. The characteristic sounds and amplitude of voltages from each muscle were noted.

A special investigation was made of activity in the diaphragm in a young

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Research Associate, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital.

Associate Professor of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital.

Instructor, Department of Physical Medicine and Rehabilitation, School of Medicine, University of Michigan and University Hospital.

Associate Professor of Pediatrics, University of Michigan; Medical Director, Poliomyelitis Respirator Center, University Hospital.

This study was aided by a grant from The National Foundation (formerly, The National Foundation for Infantile Paralysis).

Acknowledgment: Appreciation is expressed to Charles A. Metzner, Ph.D., from the Bureau of Public Health Economics, School of Public Health for his help and guidance in the statistical analysis of these data and to Wilfrid T. Dempster, Ph.D., from the Department of Anatomy for his valuable suggestions and criticisms.

man who had sustained a traumatic transverse myelitis at the fourth dorsal segment, resulting in a total sensory and motor loss below the nipple line. The method of study was the same as that just described.

Results

Passive Expiration. Studies made of the diaphragm during passive expiration showed that electrical activity always continued from inspiration into expiration. This carryover activity occurred even though each subject had been instructed to relax after taking in a breath. The voltage pattern consistently reached its greatest amplitude at, or slightly before, the end of inspiration, and then tapered to its stopping point in expiration. In a significant number of observations (statistically significant at the 0.001 level) the deeper the inspiration, the longer the duration, proportionately, of diaphragmatic activity during expiration. In some instances, the activity continued through as much as 98 per cent of expiration.

In a similar manner, activity in the intercostal muscles, when present during inspiration, frequently carried over into passive expiration; however, in some instances the activity stopped at or near the end of inspiration. As shown in table 1, the carryover activity was increasingly likely to occur in progressively lower intercostal spaces. In the ninth and eleventh interspaces, the carryover activity was noted in all observations made during passive expiration. The data were not sufficient for a statistical analysis of the relation between breath size and frequency of carryover activity, but in several of the intercostal muscles, the frequency appeared to be greater as deeper breaths were taken.

Comparing the duration of the carryover activity of the diaphragm with that of the alternate intercostals showed that the diaphragm was active the longest and that the duration of carryover decreased sequentially from the eleventh intercostal muscles upward. When alternate muscles were studied in pairs and the duration of their carryover activity was determined, the lower member of each pair was active longer during an expiration than was the upper member in a significant number of observations (table 2).

During quiet breathing, electrical activity was absent in expiration except for carryover activity in the diaphragm and occasionally in the first intercostal. When there was no intercostal activity during inspiration, none ever occurred in expiration.

Forced Expiration. During forced expiration, intercostal muscle activity was recorded in 97 per cent of the observations. Activity began at, or slightly before, the onset of expiratory airflow in approximately one third of the instances, and at some time after the onset in the remainder. As shown in table 3, the smaller the volume of air in the lungs at the beginning of expiration, the greater the likelihood that intercostal activity would begin at the onset of expiration. For example, in 33 of 34 observations, intercostal activity began at

Table 1: Relation Between Carryover and Cessation of Activity in Diaphragm and Intercostal Muscles

Muscles	Instances of Activity Carrying over into Passive Expiration	Instances of Activity Stopping at End of Inspiration	Relative Frequency of Carryover Activity*
Intercostals:			
1	11	19	37%
3	20	17	54%
5	28	11	72%
7	16	6	73%
9	14	0	100%
11	16	0	100%
Diaphragm	39	0	100%

* Incidence of activity carrying over into passive expiration expressed as per cent of the total number of observations. The observation that the order of relative frequency of carryover progresses from the first to the ninth intercostal is statistically significant at the 0.01 level.

Table 2: Duration of the Carryover Activity of the Diaphragm and Intercostals During Passive Expiration

Pairs of Muscles		Total Number of Pairs Observed	Number of Pairs in Sequence*	Level of Confidence†
Diaphragm	11th Intercostal	8	8	0.004
11th Intercostal	9th Intercostal	11	11	<0.001
9th Intercastal	7th Intercostal	19	19	<0.001
7th Intercostal	5th Intercostal	7	6	0.063
5th Intercostal	3rd Intercostal	15	14	<0.001
3rd Intercostal	1st Intercostal	9	9	0.002

* Number of times the lower member of a pair of intercostals surpassed the upper member in duration of activity.

† By the binomial test.

the onset of a forced expiration that was initiated at the end of a tidal expiration.

Table 3 also indicates that when a forced expiration was preceded by a deep inspiration, intercostal activity was more likely to begin after the onset of expiration. In most observations of deep breathing, electrical activity stopped at the end of inspiration and resumed after forced expiration had begun. In some instances, however, electrical activity carried over into early expiration before stopping, and then resumed after a pause. It was not possible to determine whether these voltages came from the internal or external intercostal muscles.

When the intercostals became active after the beginning of a forced expiration, they were recruited sequentially from the eleventh intercostal upward, irrespective of the size of the preceding breath. Table 4 shows that when the alternate intercostals were paired, the lower member of each pair became active before the upper member in a statistically significant number of instances. When the preceding inspiration was small, both members of the pair tended to fire at the onset of forced expiration.

On many occasions during forced expiration, low voltage with a "distant" sound was picked up by the needle in the diaphragm. When this activity coincided in onset with activity from the needle in the eleventh intercostal muscle, it was deemed to be arising from the latter rather than from the diaphragm. To affirm that the onset of expiratory activity from both needles coincided, only those observations showing a preceding period of inactivity were considered. In these instances, no activity was noted originating in the diaphragm during forced expiration, although activity occasionally carried over from a deep inspiration. The voltage in the diaphragm always stopped abruptly at the onset of a forced expiratory effort.

Studies made of the patient with transverse myelitis provided records of diaphragmatic activity without electrical interference from nearby active intercostal muscles (fig. 1). Diaphragmatic voltages were not found during a forced expiratory effort, irrespective of the size

Table 3: Relation Between Breath Size and Point of Onset of Activity During Forced Expiration

Size of Preceding Inspiration (Per Cent of PVC)	Instances of Activity Beginning at Onset of Expiration	Instances of Activity Beginning Later Than Onset of Expiration	Relative Frequency of Activity Beginning at Onset of Expiration*
0-1	33	1	97%
2-5	19	18	51%
6-10	17	54	24%
11-15	18	26	41%
16-35	8	50	14%
36-70	2	22	8%

* Incidence of activity beginning at the onset of expiration expressed as per cent of the total number of observations. When considered as a whole, the inverse relationship observed between frequency of activity beginning at the onset of expiration and size of the preceding inspiration is statistically significant at the 0.01 level.

Table 4: Order of Recruitment of Alternate Intercostal Muscles During Forced Expiration

Order of Recruitment 1st	2nd	Total Number of Pairs Observed	Number of Pairs in Sequence*	Level of Confidence†
11th Intercostal	9th Intercostal	24	22	<0.001
9th Intercostal	7th Intercostal	16	15	<0.001
7th Intercostal	5th Intercostal	13	12	0.002
5th Intercostal	3rd Intercostal	14	13	<0.001
3rd Intercostal	1st Intercostal	25	24	<0.001

* Number of times the lower member of a pair of intercostals preceded the upper member in onset of activity.

† By the binomial test.

of the preceding inspiration. During passive expiration, activity always continued from inspiration into expiration. This pattern is consistent with that found in normal subjects.

Discussion

The presence of electrical activity in the diaphragm during passive expiration suggests a braking action by this muscle to oppose the normal elastic forces of the lungs rather than the exertion of a true expiratory effort. The anatomic structure of the diaphragm supports this view. All of its fibers are arranged in radial fasciculi inserting into the central tendon. Shortening of the fibers causes a flattening of the dome, preventing the production of an expiratory force. Furthermore, no electrical activity has been found in the diaphragm during forced expiration.

It is possible that activity in the intercostal muscles during passive expiration also indicates a braking action. Although it could not be determined whether the exploring needle was in the internal or external intercostal muscle, the same muscle appeared to be active during both inspiration and passive expiration, since there was no change in character of the voltage other than a tapering in amplitude. At the onset of forced expiration, however, there was generally an abrupt change in the amplitude and frequency of voltage. Those instances in which the electrical activity carried over from inspiration and tapered to a stop before resuming with high amplitude may represent a braking action during

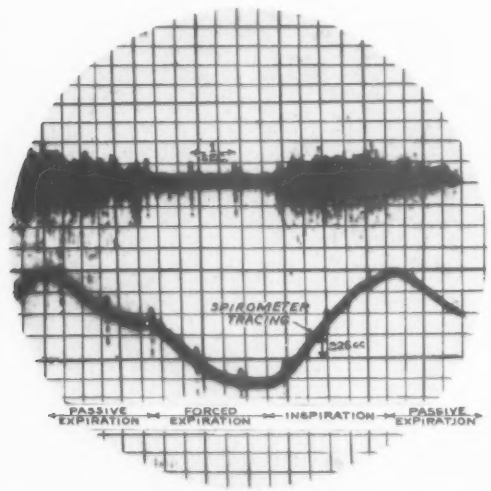

Fig. 1 — Diaphragmatic action potentials during various phases of respiration in a patient with transverse myelitis at the fourth dorsal segment.

the first part of the expiration. If the early carryover had represented an expiratory effort, the airflow tracing would have been uneven because of the ensuing pause. No unevenness was observed, however.

To be consistent with general economy of body structure and energy, the diaphragm and intercostals should function in a coordinated manner. Accordingly, during passive expiration the intercostals would not be expected to produce an expiratory force at the same time that the diaphragm was serving as a brake. In addition, it is unlikely that these muscles would act together to provide an expiratory effort when the elastic forces of the lung were greatest, and then discontinue the effort as the total elastic force lessened. Actually, the braking action of the intercostals and diaphragm decreases as the elastic force diminishes and the expiratory endpoint is approached. Campbell[2] has also postulated this opposing action for the muscles of inspiration on the basis of the difference between the theoretical and actual expiratory airflow curves.

When intercostal muscles are recruited sequentially from below upward during forced expiration, it is reasonable to assume that the lower portion of the thorax would become smaller before the upper. This would produce a pressure gradient within the chest consistent with the principles of an efficient mechanical system to deflate the lungs.

When a preceding inspiration is less than 1 per cent of PVC, the intercostal muscles almost always become active simultaneously with the onset of forced expiration. Under these circumstances, almost the entire expiration occurred in the expiratory reserve compartment and the change in the pattern of intercostal activity can perhaps best be explained by the abrupt change in pulmonary mechanics. When the lungs are deflated beyond the resting end-tidal volume (i.e., into the expiratory reserve compartment), it becomes necessary to counteract the elastic forces of the lung-thorax system that are tending to return it to the resting end-tidal volume. Consequently, it appears reasonable that a prompt, vigorous muscular effort would be required to establish rapid expiratory flow rates at lung volumes less than the resting end-tidal volume. Another example of a need for increased expiratory force and simultaneous contraction of intercostal muscles is that occurring when a person coughs during a tidal breath.

Summary

By use of a multiple-channel electromyograph with needle electrodes, a study was made of the patterns of action of the diaphragm and intercostal muscles during expiration following breaths of varying sizes. The significant findings were:

1. Activity in the diaphragm consistently continued from inspiration into passive expiration; the duration of carryover activity was directly related to breath size.

2. Intercostal activity frequently continued into passive expiration; this carryover activity was more likely to occur in the lower than in the upper intercostals.

3. The duration of carryover activity in passive expiration was longest in the diaphragm and decreased sequentially from the eleventh intercostal muscle upward.

4. No activity could be found in the diaphragm during forced expiration.

5. Intercostal activity was almost always present during forced expiration.

6. The likelihood of intercostal activity beginning at the onset of forced expiration was inversely related to the volume of air in the lungs at the end of inspiration.

7. When intercostal activity began after the onset of forced expiration, it was sequentially recruited from the eleventh intercostal upward.

A hypothesis has been made that during passive expiration, the diaphragm and intercostal muscles exert a braking force against the elastic forces of the lung.

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August 21-26, 1960

A Reaction of Degeneration Scanner

Arthur J. Heather, M.D.
and
Martin A. Apostolico, Jr., B.S.
Wilmington, Del.

● A simplified, portable, compact reaction of degeneration scanner is described, and the electrical characteristics of the instrument discussed in detail. This apparatus provides a quick bedside method for the detection of peripheral nerve lesions. The development of the scanner points up the advantages of cooperation between electronics engineers and physicians working together to design as well as test new and improved equipment.

The determination of chronaxie values is time-consuming and requires transporting the patient to the department of physical medicine, after an appointment has been made for the studies. The pocket-size instrument to be described affords the examiner a quick method to rule out peripheral nerve lesions at the bedside. The features which make the reaction of degeneration scanner a reliable, portable instrument are its small size, self-contained power supply, square wave pulse output, and simplicity of operation. The scanner is so constructed that both the magnitude and duration of the pulse can be selected (fig. 1).

By definition, the failure of a muscle to contract when its motor point is stimulated with a current of adequate strength and a duration of 1 msec. (milliseconds) indicates denervation. In denervated muscle, chronaxie values 50 to 200 times that of normal muscle are found. Based on this increase in duration of stimulus, the scanner is designed to provide a rectangular output pulse of 0.5 and 0.9 msec. duration with a fast rise and fall time. The intensity of the shock is variable. The normal side is examined first and the pulse duration and voltage needed to elicit a contraction are compared with the muscle suspected of denervation. Failure to respond to a 0.9 msec. pulse indicates denervation. Bourguignon,[1] Moldaver,[2] and Erdman[3] in their chronaxie studies found an upper limit of 0.7 msec. in innervated muscle, using both condensor and electronic apparatus.

To operate the scanner, the dispersive electrode is moistened with either water or electrode paste and attached to the upper portion of the extremity when testing muscles of the forearm or leg. In examination of the anterior trunk

Instructor, Physical Medicine and Rehabilitation, School of Medicine, University of Pennsylvania, Philadelphia; Medical Director, Eugene duPont Hospital and Rehabilitation Center.

Project Electronics Engineer, All American Engineering Company.

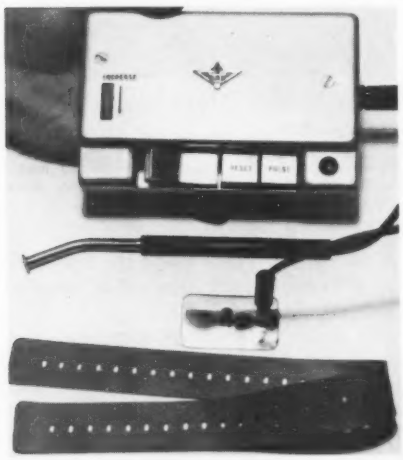
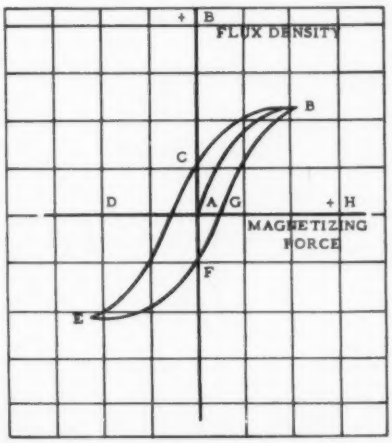


Fig. 1 — The scanner is 6 in. long, 2½ in. high, and 3½ in. wide.



HYSTERESIS LOOP

Fig. 2 — Hysteresis loop described in the text to explain the output pulses.

muscles the electrode is placed beneath the trunk, and vice versa. The desired pulse duration is chosen by engaging either the 0.5 or 0.9 msec. selector switch. Stimulus of negative polarity is applied to the muscle motor point by depressing the pulse button. The reset switch is then depressed and the instrument is instantly ready for the next stimulus. A rheostat enables the operator to vary the output from 50 to 100 volts.

The 0.5 and 0.9 msec. pulses are possible by utilizing the hysteresis loop of a saturable core. For example, when a positive magnetizing force is applied to an iron ring by passing a direct current through a coil in a predetermined direction an increase in flux density results along the line *A B* (fig. 2). When the positive magnetizing force goes to zero from *B* to *C*, a residual flux density, *A C*, remains in the material. When the current is reversed in the coil, the negative magnetizing force results in the flux density varying as the line *C D E*. Thus a symmetrical hysteresis loop is formed. At point *D*, the flux density is zero and the magnetizing force, *A D*, required to reduce the density to zero is termed the coercive force. Reducing the magnetizing force to zero, *E F*, again leaves a residual flux density, *A F*, but in the opposite direction. From this point the residual charge will not return to zero at point *A*, but will continue along the line *F G B*, with the application of a positive magnetizing force.

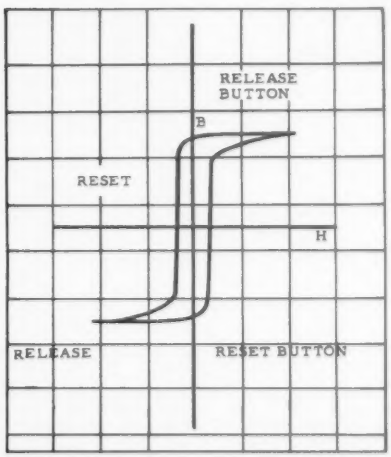


Fig. 3 — D.C. hysteresis loop for 48 alloy used in the scanner.

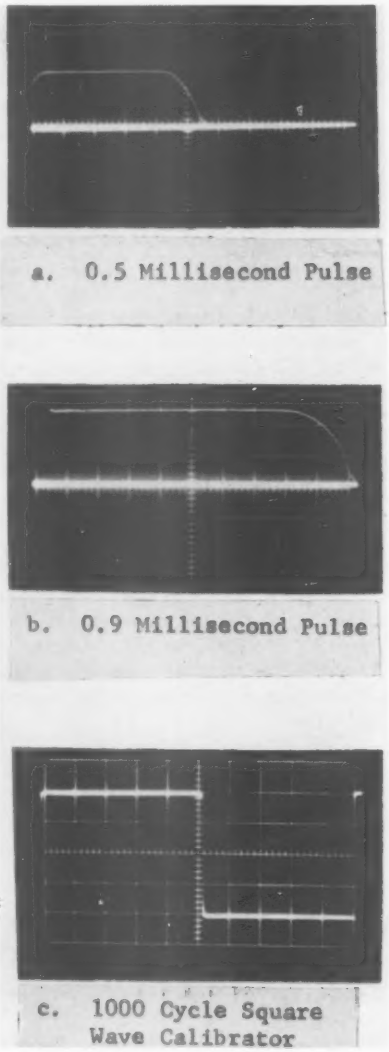


Fig. 4 — Oscilloscopic traces of the (a) 0.5 msec., (b) 0.9 msec. pulses. The 1,000 cycle square wave calibration is shown for comparison in (c).

In figure 3, a square hysteresis loop is illustrated which provides a rectangular output pulse with a fast rise and fall time. Here a bistable magnetic core is used along with a pulse winding, an output or load winding, and a reset winding wrapped on the core. Placing a

direct current voltage across the pulse winding will result in a constant $\frac{d\phi}{dt}$ from the equation:

$$V_b = N_c \frac{d\phi}{dt} \qquad \text{(Equation 1)}$$

where

V_b = D.C. voltage applied
N_c = number of turns on the control winding
$\frac{d\phi}{dt}$ = incremental rate of change of flux with respect to an incremental change in time.

With a constant rate of change of flux the output voltage also will be constant. When a magnetic core saturates, $\frac{d\phi}{dt}$ falls to zero and the output voltage falls to zero. The time duration of the output pulse is given from Lenz's Law:

$$t = \frac{N_c \phi}{V_b} \qquad \text{(Equation 2)}$$

where σ is the saturation or switching flux. The reset winding is necessary to reverse the magnetizing force in order to start at the same point on the hysteresis loop so that the output pulse will be correctly polarized. Resetting also keeps the output pulse constant at the selected time duration. Figures 4a and 4b illustrate the 0.5 and 0.9 msec. output wave forms. They were reproduced with a Polaroid camera using a Tektronix type 531 oscilloscope. Each small horizontal division represents 100 μsec. (microseconds), and each small vertical scale division equals 5 volts. Figure 4c shows a 1,000 cycle, 100 volt peak-to-peak square wave calibration for comparison.

As can be seen from Equation 2, the time duration of the output pulse is inversely proportional to the applied voltage; therefore, the batteries used in this instrument cannot have any drop in voltage with changing load or age. Batteries possessing these properties are used in the scanner. Figure 5 is a plot of the output voltage versus ampere hours at the load current drawn by the instrument. This constancy in voltage is assurance that the time duration of the output pulse will be constant throughout the lifetime of the batteries. The batteries may be recharged 20 times.

Summary

A simplified, portable, compact reaction of degeneration scanner is described, and the electrical characteristics of the instrument are discussed in detail. This apparatus provides a quick bedside method for the detection of peripheral nerve lesions. The development of the scanner points up the advantages of cooperation between electronics engineers and physicians working together to design and test new and improved equipment.

References

1. Bourguignon, G.: La Chronaxie chez l'Homme, Paris, Masson & Cie, 1923.
2. Moldaver, J.: Clinical Chronaxia (Electrodiagnosis). Dis. Nerv. System **3**:20 (Jan.) 1942.
3. Erdman, W. J., II: Effect of Variations in Technique on Clinical Chronaxie De-

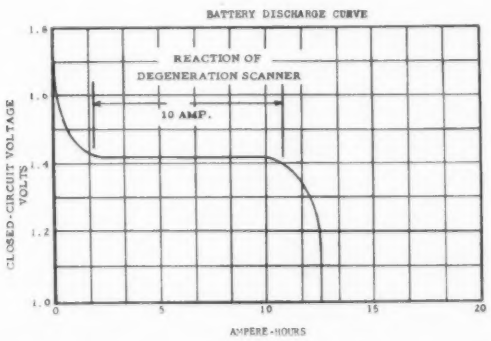


Fig. 5 — A plot of the output voltage versus ampere hours at the load current drawn by the instrument.

terminations. Am. J. Phys. Med. 33:167 (June) 1954.
4. Licht, S. (ed.): Electrodiagnosis and Electromyography, New Haven, Conn., Elizabeth Licht, Publisher, 1956.
5. Shea, R. F.: Transistor Circuit Engineering, New York, John Wiley & Sons, Inc., 1957.
6. Landee, R.; Davis, D., and Albrecht, A.: Electronic Designers' Handbook, New York, McGraw-Hill Book Company, Inc., 1957.

Milwaukee Curative Workshop

The Curative Workshop of Milwaukee, Inc., a community rehabilitation center, has entered into an affiliation with Marquette University which will integrate areas of professional training, research, and patient services in which both are mutually interested.

Dr. John S. Hirschboeck, dean of the medical school, said that such an affiliation would provide a broad range of educational facilities for students in medicine or allied fields of rehabilitation. It would also provide joint research facilities and an interchange of staff and facilities in the two institutions, as well as effect a comprehensive program of rehabilitation services for disabled patients.

While the university and workshop will be affiliated in projects concerning the education, research, and community service aspect, both institutions will continue their separate and independent existence, control, and management. The selection and employment of professional staff in any programs or projects in which both are engaged, however, will be by mutual agreement of both parties. The university may appoint qualified staff members of the workshop to academic positions within the University.

WILLIAM SCHMIDT TESTIMONIAL

WILLIAM H. SCHMIDT, M.D.

William H. Schmidt of Philadelphia was feted at a testimonial dinner on June 24 at the Union League Club. Dr. Schmidt has recently relinquished his duties as head of the Department of Physical Medicine at Jefferson Medical College and Hospital to become Emeritus Professor. Toastmaster for this memorial occasion was George Morris Piersol.

Herman Rudolph of Reading, Pa., delivered the curriculum vitae address and a silver plaque commemorating the occasion was presented by William A. Sodeman, Dean of Jefferson Medical College.

Dr. Schmidt responded with a most interesting historical review of the early days of electrotherapeutics and x-ray. He declared his intention to continue actively in the practice of physical medicine and rehabilitation.

A large attendance included staff affiliates, friends, and relatives from the greater Philadelphia area.

...ANNUAL REPORTS...

American Congress of Physical Medicine and Rehabilitation

American Academy of Physical Medicine and Rehabilitation

American Registry of Physical Therapists

Report of the Finance Committee

The following is the official audited financial report of the American Congress of Physical Medicine and Rehabilitation for the year ending December 31, 1958.

Louis B. Newman, *Chairman*
Everill W. Fowlks
George C. Twombly
Frank H. Krusen, *Ex-officio*

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

Report on Examination For the Year Ended December 31, 1958

May 1, 1959

Board of Governors,
American Congress of Physical Medicine
and Rehabilitation,
30 North Michigan Avenue,
Chicago, Illinois

Dear Sirs:

I have examined the balance sheet of the American Congress of Physical Medicine and Rehabilitation as of December 31, 1958, and the related summary of net income and surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as I considered necessary in the circumstances, except as stated in the following paragraph.

I did not verify the income from subscriptions to ARCHIVES, a scientific journal published monthly by the Congress, because it was not considered practicable. However, I tested the correctness of the subscription income recorded on the books by reference to available supporting data.

Based on my examination, limited to exclude verification of ARCHIVES subscription income, in my opinion, the accompanying balance sheet and summary of net income and surplus present fairly the financial position of the American Congress of Physical Medicine and Rehabilitation at December 31, 1958, and the results of its operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

I submit the following exhibits:

Exhibit

A — Balance Sheet, December 31, 1958.

B — Summary of Net Income and Surplus for the Year Ended December 31, 1958.

Yours truly,
Joseph Kanovski
Certified Public Accountant

Exhibit A

American Congress of Physical Medicine and Rehabilitation
(Incorporated in Illinois — Not for Profit)

Balance Sheet, December 31, 1958

Assets

Current Assets:		
Cash:		
Michigan Avenue National Bank of Chicago	$ 8,195.55	
Bell Savings and Loan Association	11,000.00	
Petty Cash	100.00	$19,295.55
Accounts receivable:		
Advertisers and exhibitors	$ 2,286.86	
Membership dues and special assessment	1,500.00	
American Registry of Physical Therapists	6,792.07	
American Academy of Physical Medicine and Rehabilitation	942.76	11,521.69
Investments in United States Savings Bonds — at cost.		60,000.00
Accrued interest		528.18
Deposit at United States Post Office		50.00
Total		$91,395.42

Liabilities

Current Liabilities:	
Accounts payable	$ 4,213.07
Accrued withholding tax, payroll taxes and salaries	1,363.70
Third International Congress of Physical Medicine Custodian Liability for special assessments	1,968.27
John S. Coulter Memorial Fund	1,750.00
Subscriptions to ARCHIVES —unexpired portion	10,967.78
Dues collected in advance —year 1959	300.00
Total current liabilities	$20,562.82
Surplus, per Exhibit B	70,832.60
Total	$91,395.42

Exhibit B

American Congress of Physical Medicine and Rehabilitation

Summary of Net Income and Surplus
For the Year Ended December 31, 1958

Income:		
Membership dues		$12,480.00
ARCHIVES:		
Advertising — less discounts — net	$15,357.65	
Subscriptions	17,290.92	
Sale of cuts, etc.	3,888.76	36,537.33
Interest on United States Savings Bonds		1,931.00
Convention income:		
Exhibits	$11,425.00	
Direct convention expenses	7,797.70	
Convention income — net		3,627.30
Miscellaneous		1,497.71
Total income		$56,073.34
Expenses:		
Office salaries and expenses:	$40,686.20	
Printing — ARCHIVES	20,347.56	
Abstracting—ARCHIVES	765.75	
Cuts, half-tones, electros, etc.	3,682.69	
Pay roll taxes	638.47	
Professional fees	2,395.99	
Meetings	534.04	
Sundry	2,175.59	
Travel	932.86	
Total expenses	$72,159.15	
Less share of expenses billed to: American Academy of Physical Medicine and Rehabilitation	$ 600.00	
American Registry of Physical Therapists	12,000.00	
Total	$12,600.00	
Expenses — net		59,559.15
Net loss for the year		$ 3,485.81
Surplus, December 31, 1957	$72,516.34	
Adjustments — net increase	1,802.07	74,318.41
Surplus at end of the year		$70,832.60

The following is the official audited financial report of the American Academy of Physical Medicine and Rehabilitation for the year ending December 31, 1958.

AMERICAN ACADEMY OF PHYSICAL MEDICINE AND REHABILITATION

Report on Examination
For the Year Ended December 31, 1958

May 1, 1959

Board of Governors,
American Academy of Physical Medicine and Rehabilitation,
30 North Michigan Avenue,
Chicago, Illinois

Dear Sirs:

I have examined the balance sheet of the American Academy of Physical Medicine and Rehabilitation as of December 31, 1958, and the related statement of net income and surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as I considered necessary in the circumstances.

In my opinion, the accompanying balance sheet and statement of net income and surplus present fairly the financial position of the American Academy of Physical Medicine and Rehabilitation at December 31, 1958, and the results of its operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

I submit the following exhibits:

Exhibit

A — Balance Sheet, December 31, 1958.

B — Statement of Net Income and Surplus for the Year Ended December 31, 1958.

Yours truly,
Joseph Kanovski
Certified Public Accountant

Exhibit A

American Academy of Physical Medicine and Rehabilitation
(Incorporated in Illinois — Not for Profit)
Balance Sheet, December 31, 1958

Assets

Current Assets:	
Cash:	
Michigan Avenue National Bank of Chicago	$ 3,341.56
Bell Savings and Loan Association	2,000.00
Investment in United States Savings Bonds — at cost	2,000.00
Accounts receivable — Members	135.00
Accrued interest receivable	13.98
Total	$ 7,490.54

Liabilities

Current Liabilities:	
Accounts payable:	
Trade	$ 900.96
American Congress of Physical Medicine and Rehabilitation	942.76
Dues collected in advance	15.00
Total current liabilities	$ 1,858.72
Surplus, per Exhibit B	5,631.82
Total	$ 7,490.54

Exhibit B

American Academy of Physical Medicine and Rehabilitation
Statement of Net Income and Surplus
For the Year Ended December 31, 1958

Income:		
Members' dues		$ 2,230.00
Assessment		1,120.00
Initiation fees		1,350.00
Miscellaneous		149.23
Total Income		$ 4,849.23
Expenses:		
Share of office expenses billed by American Congress of Physical Medicine and Rehabilitation	$ 1,169.50	
Professional fees	1,238.27	
Office supplies	522.89	
Convention Expense	566.60	
Third International Congress of Physical Medicine	750.00	
Awards and Honoraria	356.26	
Annual and interim meetings	243.33	
Miscellaneous	228.90	
Total expense		5,075.75
Net loss for the year		$ 226.52
Surplus at the beginning of the year		$ 5,858.34
Surplus at end of the year		$ 5,631.82

AMERICAN REGISTRY OF PHYSICAL THERAPISTS

January 1 — December 31, 1958

The major activities of the Registry follow the purposes for which it was organized; namely, to advance the art and science of medicine by promotion of the understanding and utilization of physical therapy, in the prevention and treatment of human ailments, and in the maintenance of or restoration to health; to aid in developing and maintaining educational and ethical standards in physical therapy for the benefit of the public generally and for the guidance of registrants of the American Registry of Physical Therapists; to develop and conduct examinations for physical therapists to determine their competency and qualifications to administer adequately physical therapy under the prescription, direction, and supervision of licensed physicians, and to maintain a registry and make available a list of such registrants. A widespread utilization of the list of registrants is advocated to the end that the facilities and methods employed in physical therapy may effectively augment the services of American medicine. All of its activities represent an effort on the part of the Registry to carry out its original purposes.

Dr. Oscar O. Selke, Jr., of Houston, Texas was appointed to serve on the Registry Board for a period of seven years beginning January 1, 1958.

Correction: In the last annual report circulated by the Executive Office of the Registry, the statement was made that Doctor James W. Rae, Jr. was appointed to serve on the Board for a period of seven years beginning January 1, 1958. Dr. Rae's appointment was effective January 1, 1956. Doctor Donald L. Rose of Kansas City, Kansas was appointed to serve on the Registry Board for a period of seven years beginning January 1, 1957.

Misses Dorothy Baethke and Mary Lawrence represent the American Physical Therapy Association on the Board of the American Registry of Physical Therapists.

At the Interim Meeting, April 26-27, 1958, The Mayflower, Washington, D.C., the following motions were passed:

Article V—Advisory Board, Section 1, of the Registry By-Laws was amended to include the American Neurosurgical Association as well as the American College of Surgeons.

Article VI—Registrant Members, was amended to read "possess the moral and educational qualifications set by the Board of Registry by appropriate rule or regulation including satisfactory completion of course of study in a school for physical therapists approved by the Council on Medical Education and Hospitals of the American Medical Association; or satisfactory completion of a comparable course of study in physical therapy in Canada, approved by the Canadian Medical Association."

The chairman of the Registry Board was authorized to convey to the Advisory Committee on Physical

Therapy Education of the AMA that the Registry Board has a continued interest in physical therapy education and strongly feels that a physician oriented to the area of physical disabilities be represented on the investigating teams.

An article for publication in the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION is to be prepared by Clay Gerken, Ph.D., to explain the efforts of the Registry as far as physical therapy education is concerned. This article is to incorporate the explanatory table as presented by Doctor Gerken to the members of the Registry Board.

Dr. Gerken is permitted to make available to Dr. Lillian Long, Director of the Professional Examination Service, data on the scores attained by certain individual physical therapists who have written both the Registry examination and/or both of the examinations developed in cooperation with the APTA.

The sum of $3,000 was appropriated for compensation to Dr. Gerken for study of material for a new Registry examination.

Notice of cancellation of registrations is to be sent to county medical societies, American Hospital Association, and APTA. This procedure applies to the area in which the cancellation occurs and the first letter of notification is to be reviewed by the legal counsel.

Registrar was authorized to determine through the Illinois Department of Registration and Education the status of the National Institute of Physical Therapy and Massage, 159 E. Ontario Street, Chicago.

A charge of $2.50 is established as the cost of the Registry Directory.

The Registry goes on record as opposing Bill H.R. 9467.

Applicant for registration may write the Registry examination for a total of four times — the original examination and three retakes.

Registrar is delegated to obtain information from the printer to determine whether or not a subscription to the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION may be offered to registrants of the ARPT at reduced rates.

Further information was to be conveyed to a public relations counsel relative to securing a more detailed program to be presented to the Executive Committee for consideration and action.

Approval of request for $2,302.07 to cover salaries of additional secretarial help for the period, January-December 1957.

Dr. Gerken was authorized to send a letter or mimeographed information to various schools having curricula in physical therapy informing them that a pool of items collected for possible use in Registry examinations is available upon request.

Suggested amendments to the Registry By-Laws are that physical therapists be referred to as "registrants" rather than "members." Consideration is to be given on how a registrant should be censured.

Annual meeting of Registry Board to be held in Kansas City, on November 24-25, 1958.

At the annual meeting, October 25-26, 1958, Hotel Muehlebach, Kansas City, Mo., the following motions were passed:

Future amendment of Registry By-Laws to (a) revise Article V, Section 1, by deleting words, ". . .and the American Physical Therapy Association. . ."; (b) incorporate as part of By-Laws the composition of the Executive Committee (chairman, vice-chairman, registrar and representative of the APTA), its functions in terms of members; three members to have voting power including chairman, vice-chairman and APTA representative; (c) include statement to the effect that members of the Advisory Board meet with the Registry Board once yearly; (d) removal of American Academy of Neurology from list of organizations to be represented on the Advisory Board; chairman of Registry Board to provide legal counsel with names of various professional organizations to be represented so the proper amendment can be drawn. Deletion of APTA representation and consideration of which specific neurosurgical groups are to be represented in this amendment; (e) include officers of the Registry Board under Article IX, Section 2, Chairman, Vice Chairman, Registrar-Secretary-Treasurer, with latter as ex-officio member; (f) accept Article II adding after Section 3, Registrants, the following: "adding designation that the letters, ARPT, be used and clean up terminology throughout balance of By-Laws so that the word, 'member' is not used — use only term, 'registrant,' and 'physical therapist' where they apply"; (g) revise Article VI to include, "letters ARPT may be used by persons registered with the American Registry of Physical Therapists."

The Board of ARPT expresses its commendation of efforts made by representatives of the APTA and representatives of the ARPT to resolve mutual problems and particularly to express its appreciation to Dr. Lillian Long and Dr. Clay Gerken for their interest in and understanding of problems relating to determination of professional competence of physical therapists. The Registry Board expresses its approval of further deliberation by Drs. Long and Gerken and suggest they be empowered to perform those functions and activities they believe are necessary to gain acceptance by means currently being used to evaluate competence of physical therapists. Investigation to be made of reliability, validity and propriety of reposing confidence in these means of evaluating competence. Dr. Hinman, Assistant Secretary of AMA Council on Medical Education and Hospitals, was requested to place on agenda of the meeting of the Advisory Committee on P. T. Education in February, 1959 for discussion that a request for information as prepared by Dr. Gerken covering schools as to whether they are above average, average or considerably below average, and such information is to be kept strictly confidential, may be had from ARPT.

Registrar to obtain estimate on having inactive and closed Registry files microfilmed.

Registrar to report to Board at next meeting regarding additional space needed, number of people required and additional funds for operation of Registry activities. Appropriation from reserves (bonds and savings) until 1961, of the sum of $4,000 to be used at the discretion of the Registrar (additional staff and office space) for the purpose of operating the office more efficiently.

Executive Committee of Registry Board be empowered to continue consideration of problems relating

to apparent needed expansion of Registry Executive Office. Executive Committee empowered to meet with representative of the Boards of the ACPM&R and AAPM&R to work out solutions to problems since they are common to each organization relative to space, personnel and service.

Information on National Institute of Physical Therapy to be sent to the local chapter of the APTA.

Registry Directory to be published at least every two years and more advertising be planned for these Directory editions to help pay publication charges.

The 14th edition of the Registry Directory be distributed without charge to all registrants in good standing. This edition is to also be distributed without charge to certain membership categories of the American Hospital Association.

Registry Board approves the idea of exploring the possibility of conducting another salary survey and personnel policy by means of obtaining a grant to cover the expense. Possibility of a joint survey made by ARPT and APTA should be investigated. If joint project is not feasible, then ARPT to make plans for individual survey.

Next Interim Meeting of Registry Board to be held in New York City, April 11-12, 1959.

Election of Dr. Earl C. Elkins, Chairman of the Board, Dr. Robert L. Bennett, Vice Chairman, and Dorothea C. Augustin, Registrar-Secretary-Treasurer. Miss Mary Lawrence to serve as member of Executive Committee.

A number of special problems was considered and several interim actions were completed by the Executive Committee of the Registry Board during 1958.

No registrations were cancelled during the year, 1958.

The following registrants were reinstated: Mrs. Therese R. Abdallah (Randall), 3140 Collingwood Blvd., Toledo, Ohio; Mrs. Emma S. Chapman, Old Clairton Rd., Box 27A, Clairton, Pa.; Mrs. Lois A. Coleman, 939 E. Cypress, Glendora, Calif.; Mrs. Mary T. Coughlin, 621 Spring Ave., Ridgewood, N.J.; Harry T. Covington, 6957 S. Michigan Ave., Chicago; Minnie J. Doerr, 626 S. Vermont, Los Angeles; Olympia Dukakis, 29 Russell St., Arlington, Mass.; Antoinette E. Friedman, 17 Watkins Ave., Oneonta, N.Y.; Mrs. Dorathy A. Glover, c/o Charles C. Glover, 11th Airborne Div., APO 112, New York, N.Y.; Samuel L. Kaplan, 64 College St., Jersey City, N.J.; Mrs. Frances E. Lawhorne, 2702 Los Arboles Pl., N.E., Albuquerque, New Mexico; Mrs. Florence S. McIllece, 2010 Third St., Santa Monica, Calif.; and Miss Blodwen E. Morgan, 515 Morales St, San Antonio, Texas.

A total of 164 registrants was dropped from the roster of therapists in good standing for non-payment of dues. Each registrant was notified in accordance with the By-Laws of the American Registry of Physical Therapists. A total of 79 registrants discontinued their registration.

The following registrants are deceased: Miriam E. Best, 620 Scott St., Wheaton, Ill.; Florence I. Brock, 983 Lake Dr., Box 233, Crestline, Calif.; Edith M. Cannon, 2726 Isabella, Evanston, Ill.; Cecile F. Fisher, 2237 Napoleon Ave., New Orleans, La.; Frieda A. Hagenbuch, PO Box 2115, Carmel, Calif.; Goldie G. Harding, 280 Almond St., San Luis Obispo, Calif.; Mrs. Sarah Harrison, 5702 S. 152nd, Seattle 88, Wash.; Erna Heisel, 120 N. Oak St., Hinsdale, Ill.; Teresa Kronenberger, 33 E. Grand St., Mt. Vernon, N.Y.; Joanne B. Peters, 130 E. Shields St., Cincinnati, Ohio; Sylvia T. Stroehlein, 90 Bryant Ave., White Plains, N.Y.; and Corrine Q. Way, Acting Chief, PM&R, USPHS, Dept. Health, Educ. & Welf., Washington, D.C.

Certificates Issued According to School of Graduation

Name of School	Number of Graduates Registered
Albany Medical College, Albany, N.Y.	6
Boston University, Sargent College, Cambridge, Mass.	4
Bouve-Boston School, Medford, Mass.	21
University of Buffalo, Buffalo, N.Y.	12
University of California School of Medicine, San Francisco, Calif.	20
University of Southern California, Los Angeles	7
Charity Hospital of Louisiana, New Orleans, La.	8
Childrens Hospital, Los Angeles	18
Cleveland Clinic Foundation (Frank E. Bunts Educational Institute) Cleveland, Ohio	30
College of Medical Evangelists, Loma Linda, California	11
University of Colorado School of Medicine, Denver, Colo.	30
Columbia University College of Physicians and Surgeons, New York City	41
University of Connecticut, Storrs	14
Duke University School of Medicine, Durham, N.C.	15
Hermann Hospital, Houston, Texas	39
State University of Iowa College of Medicine Iowa City	49
University of Kansas Medical Center Kansas City, Kans.	35
Marquette University School of Medicine, Milwaukee	8
Mayo Clinic, Rochester, Minn.	22
Medical College of Virginia, Richmond	27
University of Michigan, Ann Arbor	14
University of Minnesota, Minneapolis	28
New York University, School of Education, New York City	27
Northwestern University Medical School, Chicago	32
Ohio State University, Columbus, Ohio	26
Division of Physical Therapy, School of Allied Medical Professions, University of Pennsylvania, Philadelphia	62
St. Louis University, Division of Health and Hospital Services, St. Louis	10
Simmons College, Boston	8
Stanford University, Stanford, Calif.	14
University of Texas Medical Branch, Galveston, Texas	9
Grady Vaughn School of Physical Therapy, Baylor University Hospital, Dallas, Texas	15
Washington University School of Medicine, St. Louis	10
D. T. Watson School of Physiatrics, Division of Physical Therapy, Leetsdale, Pa.	61

University of Wisconsin Medical School, Madison, Wis.	2
Army Medical Service School	
Brooke, San Antonio, Texas	13
Letterman Army Hospital, San Francisco	8
Walter Reed, Washington, D.C.	6
TOTAL	762

Number of registrations completed 762

Number of examinations conducted 448

Number of retake examinations conducted 25

The following is the official audited financial report of the American Registry of Physical Therapists for the year ending December 31, 1958.

AMERICAN REGISTRY OF PHYSICAL THERAPISTS

Report of Examination For the Year Ended December 31, 1958

May 1, 1959

Board of Registry,
American Registry of Physical Therapists,
30 North Michigan Avenue,
Chicago, Illinois

Dear Sirs:

I have examined the balance sheet of the American Registry of Physical Therapists as of December 31, 1958, and the related statements of net income and surplus for the year then ended. My examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other auditing procedures as I considered necessary in the circumstances.

In my opinion, the accompanying balance sheet and statement of net income and surplus present fairly the financial position of the American Registry of Physical Therapists at December 31, 1958, and the results of its operations for the year then ended in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

I submit the following exhibits:

Exhibit

A — Balance Sheet, December 31, 1958.

B — Statement of Net Income and Surplus for the Year Ended December 31, 1958.

Yours truly,

Joseph Kanovski
Certified Public Accountant

Exhibit A

American Registry of Physical Therapists
(Incorporated in Illinois — Not for Profit)

Balance Sheet, December 31, 1958

Assets

Current Assets:		
Cash:		
Michigan Avenue National Bank of Chicago	$11,523.45	
Bell Savings and Loan Association	2,500.00	$14,023.45
Accounts receivable — dues and registration	$ 2,079.00	
Less reserve for possible losses	650.00	1,429.00
United States Savings Bonds — at cost		50,000.00
Accrued interest		415.39
Total		$65,867.84

Liabilities

Current Liabilities:		
Accounts payable:		
Trade	$ 5,115.50	
American Congress of Physical Medicine and Rehabilitation	6,792.07	$11,907.57
Accrued federal excise tax.		16.65
Dues collected in advance — year 1958		16,312.00
Deposits with applications (subject to refund if applications are rejected)		720.00
Total current liabilities		$28,956.22
Surplus, per Exhibit B		36,911.62
Total		$65,867.84

Exhibit B

American Registry of Physical Therapists

Statement of Net Income and Surplus
for the Year Ended December 31, 1958

Income:		
Dues		$22,239.00
Registration fees		6,817.00
Sales:		
Pins	$ 238.50	
Emblems	292.50	
Directory	42.00	573.00
Interest		1,414.60
Miscellaneous		1.50
Total income		$31,045.10

Expenses:		
Share of office expense billed by American Congress of Physical Medicine and Rehabilitation	$12,000.00	
Examinations — supervision and grading	835.61	
Meetings and conferences	5,838.56	
Purchase of pins	1,057.50	
Office expense	2,753.44	
New certificate	11,413.00	
Archives subscriptions to newly registered therapists	1,160.00	
Research and evaluation of Registry examination	3,000.00	
Legislation reporting service	540.00	
Professional fees	3,811.78	
Directory, 14th edition (preliminary)	1,731.40	
Miscellaneous	117.63	
Total expenses		44,258.92
Net loss for the year		$13,213.82
Surplus at beginning of the year		52,427.51
Adjustment	2,302.07	
Surplus at end of the year		$36,911.62

Respectfully submitted,

Dorothea C. Augustin

AMERICAN REGISTRY OF
PHYSICAL THERAPISTS

Dorothea C. Augustin, Registrar

IMPORTANT ANNOUNCEMENT

The Editorial Board of the *ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION* has established a special subscription rate of $5.00 per year to be granted to bonafide residents in physical medicine and other specialties in the United States, its territorial possessions, Mexico, Canada, United Kingdom and Europe. The following rules apply:

1. The subscription may be entered for a period not to exceed three years.
2. All orders for this special rate must be accompanied by a letter of verification from the director of the training program confirming the resident's status and the number of years remaining in the resident's training program.
3. This special rate is not applicable if less than one year of training remains to be completed in the applicant's residency program.
4. The subscription is not transferable and must be entered in the resident's name. It cannot be sent to a hospital, organization, institution, or a person other than the subscriber.

Those desiring to avail themselves of the special rate to residents should write to Archives of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2.

abstracts

Brine Bath Treatments for Decubitus Ulcers. R. H. Nyquist. J.A.M.A. **169**:927 (Feb. 28) 1959.

The author presents a complete review of the treatment of decubitus ulcers that has evolved at a large spinal cord injury service over a 12 year period. Systemic treatment with reference to diet, hemoglobin levels, hormone injections, fluid intake, medications and general hygiene is elaborated upon. The use of debridement, ultraviolet radiation, and ward care in the local treatment of the ulcer is carefully discussed. The paper's major emphasis is on the use of the agitating brine bath as an aid in the healing and cleansing of the gangrenous ulcer. A solution containing 5 per cent crude rock salt and 2.5 per cent magnesium sulfate provides a bacteriocidal and favorable osmotic effect. A Hubbard tank is preferred but for the more peripheral ulcer a small tank is suitable. The initial brine temperature is about 37.8 C (100 F); it is allowed to decline during the 20 minutes of administration. The open dry treatment is preferred once clean granulations develop.

Role of Afferent Activity from the Bladder in Regulating its Activity. D. J. Marsh; G. Suzuki, and F. H. Meyers. Am. J. Physiol. **196**:351 (Feb.) 1959.

The influence of intrinsic activity of the bladder on sympathetic outflow was studied in 12 anesthetized cats. Afferent impulses from the bladder traversing the pelvic nerves were blocked by local anesthesia and pelvic nerve section. Efferent sympathetic activity was measured by electrodes leading off the hypogastric nerves. The bladders were kept empty during the studies. Four of the six animals in the local anesthesia experiments and seven of the nine cats who had their pelvic nerves sectioned, showed "a convincing decrease in sympathetic efferent activity." The authors are mainly concerned with emphasizing that regulation of activity of the smooth muscle of the bladder is not specifically dependent on dual, antagonistic extrinsic nerve impulses (parasympathetic and sympathetic), but that intrinsic control exists and that sensory afferents from the bladder do initiate reflex sympathetic inhibition.

Congenital Muscular Hypertrophy. H. Zellweger, and William E. Bell. Neurology **9**:160 (Mar.) 1959.

Muscular hypertonia without muscular hypertrophy is physiologic in young infants and usually disappears by the third month. Its persistence or its association with hypertrophy is pathologically significant. The literature on congenital muscular hypertrophy is reviewed and three additional case reports of patients with congenital muscular hypertrophy are presented. It is concluded that congenital muscular hypertrophy in infancy is not a single disease entity and that four different categories must be distinguished: 1) Congenital muscular hypertrophy associated with brain disease: Mental retardation is prominent in this condition. 2) Thomsen's disease or myotonia congenita: Distinguishing this form can be made by the appearance of myotonic phenomena and inability to relax. 3) Muscular glycogenosis: Hypotonia, weakness and the demonstration of abnormal glycogen deposition distinguishes this condition. 4) Benign idiopathic congenital muscular hypertrophy: This form is reversible and is considered an exaggeration of physiologic hypertonia. The implication of hypothyroidism as a cause of muscular hypertrophy is doubted although thyroid medication may have a beneficial effect in patients with hypertrophy and hypertonia.

Effect of Age on the Discrimination of Lifted Weights. H. D. Landahl, and J. E. Birren. J. Gerontol. **14**:48 (Jan.) 1959.

The ability to discriminate lifted weights was studied in a group of 39 young (median age 24 years) and 42 elderly (median age 74 years) subjects. The subjects were required to discriminate a standard weight of 100 gm. from a variable weight; 100, 105, 110 or 115 gm., in 10 different series of judgments systematically varied. In simultaneous discrimination (weights presented to both hands simultaneously) the relative performance of elderly to young persons was 70 per cent for normal speed and 60 per cent under time limited conditions. In successive discrimination, the elderly did nearly as well as the younger subjects (about 93 per cent). Perseveration was present more in the elderly subjects and appeared as a perseveration of a

temporary fluctuation in the ability to discriminate. There was no significant difference between the two age groups in exhibiting favoritism for either hand. In all instances the reaction time of the elderly subjects was slower by about 0.5 second. Neither group showed a relation between reaction time and task difficulty.

Phenylketonuria: An Unusual Case. S. A. Leonard, and F. L. McGuire. J. Pediat. **54**:210 (Feb.) 1959.

A brief review of the literature on phenylketonuria (phenylpyruvica oligophrenia) with special emphasis on the spectrum of mental retardation is given. It is reported that less than one per cent of the patients have borderline normal intelligence. The authors believe as do others that this figure is undoubtedly higher if the general population is included. A case report of a patient with phenylketonuria and borderline normal intelligence is presented. The authors make a plea for discontinuation of the term oligophrenia. They feel that it is no longer compatible with present knowledge of the disease.

Akinesia in Parkinson's Disease. R. S. Schwab; A. C. England, and E. Peterson. Neurology **9**:65 (Jan.) 1959.

The term akinesia in Parkinson's disease describes a motor deficit resembling fatigue. It differs in that a motivating stimulus can produce a brief improvement in performance much greater than can be recruited in fatigue. The authors studied akinesia by examining the voluntary work performance of the first dorsal interosseus muscle and comparing this with the ergogram produced by electrical stimulation. About 50 patients with Parkinson's disease were examined for the presence of akinesia and this entity was compared with the presence of other findings. The existence of tremor did not correlate with akinesia. Rigidity was more uniformly associated with akinesia as was loss of intelligibility in speech and of intellectual abilities. The presence of abnormal electroencephalograms, and dilation of the third ventricle on pneumencephalography also correlated with akinesia and sensitivity to the belladonna drugs were other symptoms frequently seen. Akinesia is made more severe by neurosurgical intervention if there is bilateral involvement and it is slightly improved by analeptics and physical therapy.

Diphenylhydantoin (Dilantin) After 20 Years. Patrick F. Bray. Pediatrics **23**:151 (Jan.) 1959.

This is an excellent review article which combines the history, preparations and dosage, occurrence and management of side reactions, toxic reactions and mechanisms of therapeutic action of Dilantin. In addition, a brief discussion of more recently introduced anticonvulsant medication is included. Of particular interest, and giving strong emphasis to the discussion of the drug, is the review of experiences with 84 patients during a six-month period. The case material was divided into three groups. Group 1; 29 patients who were receiving diphenylhydantoin and required no change in dose. Over half of these showed complete control, and 27 of the 29 average one seizure or less per month during the six-month period. Group 2; 20 patients in whom diphenylhydantoin was added to other therapy or replaced other medication. Again one-half showed complete control and five more averaged one attack or less per month. Group 3; 35 patients in whom the only change was to increase the dose of diphenylhydantoin. Only five of these patients failed to show significant decrease in the incidence of seizures. This paper emphasizes the necessity for adjusting the dosage to each patient's needs, "pushing" it to mild reactions and then decreasing slightly when necessary. It should prove to be of value to those dealing with patients who have seizures.

Pathogenesis of Lesions in the Nervous System in Hypernatremic States I: Clinical Observation of Infants. Lawrence Finberg. Pediatrics **23**:40 (Jan.) 1959.

The author presents the clinical history of an infant who received between 30 and 40 grams of salt in a twelve-hour period through an error in formula preparation. He developed vomiting, fever, and labored breathing. He was found to be lethargic but hyperirritable and developed generalized convulsions. In spite of apparently adequate therapy for the hypernatremia-hyperchloremia, he showed evidences of severe brain damage with recurrent seizures, motor retardation, and hypertonic muscular tone. Subdural taps during the acute illness revealed bilateral effusions. Case records of six other patients with hypernatremia of various etiologies are outlined, showing similar symptoms and signs during the acute illness and showing subdural effusion. Several of these show evidence of brain damage. Two children had motor retardation prior to the illness in question so that, although they now show evidence of damage, it is not possible to state whether it existed prior to the illness or is due to it. One patient was lost to followup.

Multidisciplinary Studies of Illness in Aged Persons II. A New Classification of Functional Status in Activities of Daily Living. Staff of the Benjamin Rose Hospital. J. Chron. Dis. **9**:55 (Jan.) 1959.

This report defines an index of independence in activities of daily living that is newly evolved and which tends to qualify the progressive loss of abilities during illness in the aged. Sixty-four patients with fractures of the hip were admitted into the study in the first 18 months. Forty-five patients having evaluations over a six-month period of time and twenty-five patients were evaluated over a period of one year. It became apparent that a characteristic pattern of functional dependence existed in activities of daily living. Independence in bathing was the first activity of daily living lost, followed by loss of independence in dressing, toileting, transferring, continence and feeding. In the authors' index of independence these activities were listed by the letters A through G. The index was constructed so that the letters defining the patient's abilities prior to their fracture were listed in columns and the index indicating the independence at the end of six months was listed in rows. In this manner the progression of deterioration could be seen during the first and second six months following the fracture. These results are described.

Thrombophlebitis of the Superficial and Deep Veins Treated with Phenylbutazone (Butazolidin). Egmont J. Orbach. J. Internat. Coll. Surgeons **31**:165 (Feb.) 1959.

The author evaluates the results of short-term therapy with phenylbutazone in the treatment of 22 patients with acute thrombophlebitis affecting superficial and/or deep veins of the extremities. Signs of acute inflammation subsided rapidly and completely in almost every case, and it proved unnecessary to administer phenylbutazone for longer than one week to any of the patients treated. Phlebitis recurred in two patients; a second course of phenylbutazone was successful with one, but was not attempted with the other. The absence of toxic effects of phenylbutazone under these conditions indicates that this agent may be extremely helpful in the management of thrombophlebitis involving either superficial or deep veins. Further investigation of its potentialities in the treatment of these disorders is indicated.

De Quervain's Disease. Timothy A. Lamphier; John F. Pepi; Charles Brush, and Joseph Ostroger. J. Internat. Coll. Surgeons **31**:192 (Feb.) 1959.

A series of 84 cases of De Quervain's disease is presented. Eighty-three (99 per cent) of the patients were treated successfully by operation. Conservative therapy, rather than surgical intervention, is to be greatly discouraged, as it only prolongs disability and loss of working hours. Local injections of hydrocortisone acetate have no value in the therapy of this desease. The actual cause of the disease is unknown, although it is generally accepted in industrial circles as related to manual labor. A surgical technic for treatment of De Quervain's disease is described.

Studies in Febrile Seizures I: Height of Body Temperature as a Measure of the Febrile Seizure Threshold. J. Gordon Millichap. Pediatrics **23**:76 (Jan.) 1959.

Convulsions were provoked by heating mice, rats, guinea pigs and kittens with microwave diathermy. Fifty-one children with recurrent febrile seizures were observed. The height of body temperature was the important determinant in the induction or occurrence of seizures. Rapidity of rise of temperature was not shown as a predisposing factor nor was previous basal temperature a factor. The authors conclude that the principal aim of therapy should be the prevention of a rise of body temperature above the convulsive threshold temperature for the individual. Although the mean temperature at which convulsions occurred in the 51 patients was 104 F, the threshold temperature ranged between 102 F and 106.5 F.

The Clinical Treatment of Juvenile Amputees (1953-1956). Sidney Fishman; Edward Peizer; Jerome Siller; Bertram Litt, and Sydel Silverman. Monograph published by New York University (1958).

This work manual for a course on prosthetic education presents much information of importance to physicians and "teams" working with children with amputations. A total of 159 upper extremity amputees between the ages of 10 months and 15 years drawn from 33 clinics in 23 states was included. Obviously with such a span of ages and with so many different treatment groups, it is difficult to tabulate information or to make direct comparisons. Criteria for prescription of various elements of the prostheses and for training varied widely. Almost one-quarter of the report concerns acceptance or rejection of protheses. Unfortunately, the case summaries are extremely brief and such conclusions as are drawn regarding the psychologic reasons for acceptance or rejection are hardly acceptable from the evidence presented. Language difficulties complicate interpretation of the results. One problem is the use of undefined abbreviations, which may be clear to those working in the project, but tend to confuse the reader. The other is the use of local jargon for technical details, presenting similar problems. Some of the statistical tables appear inconsistent. It appears that cuffs, inverted Y-strap and control systems were most frequently unsatisfactory in appearance, while discomfort was usually due to the socket and

in particular its anterior rim. There was marked variation in length of training, ranging from under four hours to 144 hours, as well as in the approach to training itself. The authors conclude that further studies in four areas would be profitable: (1) Influence of personality and environment; (2) Criteria for selection of components; (3) Minimum standards of appearance, comfort, and function, and (4) Training system goals, methods and evaluation procedures.

Pathogenesis of Lesions in the Nervous System in Hypernatremic States II: Experimental Studies of Gross Anatomic Changes and Alteration of Chemical Composition of the Tissues. Lawrence Finberg; Charles Luttrell, and Henry Redd. Pediatrics **23**:46 (Jan.) 1959.

Studies were designed to observe the symptomatic effects of induced hypernatremia, to look for evidence of subdural effusions or bleeding in the meninges and brain, and to study the distribution of water and electrolyte in the tissues of animals. Solutions were injected intraperitoneally in amounts sufficient to raise the osmolar concentrations of body fluids to levels greater than 380 milliosmoles per liter. Kittens who received saline-bicarbonate solution developed lethargy, hyperirritability, tremor and ataxia very shortly after administration, and 23 of 27 showed bleeding into the brain and meninges. Kittens receiving similar concentrations of urea developed similar signs but recovered rapidly. Small intracranial hemorrhages occurred in 10 of 12 animals receiving urea. Radioactive sodium studies indicate that shrinkage of the brain and reduction of cerebrospinal fluid occur with the osmotic movement of water which occurs more rapidly than transport of sodium. Because of these two factors causing distortion, blood vessels may be expanded and bridging veins may be torn.

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book reviews

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Academy of Physical Medicine and Rehabilitation.

PRINCIPLES OF RESEARCH IN BIOLOGY AND MEDICINE: By *Dwight J. Ingle,* Ph.D. Cloth. Price $4.75. Pp. 123. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5, 1958.

This book offers a wealth of thoughts for the guidance and inspiration of people engaged in research in pure and applied biology, including medicine. The introductory sections are followed by chapters on the limitations of mind, causality, probability and randomization, errors, heteropoietic factors, principles of testing, design of experiments, interpretation of results, hypothesis and theory, and relationships among scientists. Parts of the text are witty and illuminating, like the story (page 40) of the scientist who tested scotch and soda, rye and soda, and bourbon and soda "and concluded that intoxication is caused by soda water". Each chapter ends with a good bibliography, and there is an index.

By way of criticism it must be remarked that the brevity of this book is achieved in large part by alluding to things instead of defining them or by defining without giving examples. The subheadings under "Heteropoietic Factors" are genetics, individuality of tissue functions, sex, age, activity, emotionality, bacterial pattern, environment, diet, dose, time, population, and load. The student will wonder, if these are heteropoietic factors, would the opposite be homopoietic factors, and what would they be? The two important concepts of validity and reliability need concrete examples, preferably with calculations of numerical indexes of validity and reliability, in order to make them clear and to suggest their usefulness. The concept of "control" in the sense of contratest needs space in proportion to its great importance in every biological experiment, and discussions of it should not be obscured by simultaneous use of the word "control" in the sense of regulating, adjusting, setting, or inspecting. The interesting subjects of extrapolation, induction, and sequential analysis also deserve more than passing allusions. Yet it is possible that the author has done right in trying to whet, rather than to satisfy, the student's curiosity. In any case, he has produced an interesting and attractive work.

OUTLINE OF FRACTURES: By *John Crawford Adams,* M.D. Cloth. Price, $6.50. Pp. 257, with 237 illustrations. Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2, 1958.

This book is intended primarily for the medical student, for the practitioner who seeks knowledge of general principals rather than of specialized details, and for the physical therapist.

It describes the clinical means by which a fracture should be suspected, the expected followup following reduction of the fracture, the possible complications. The book is not large, yet it contains a very sound amount of practical information. It gives a clear-cut understanding of fractures. Although many of the illustrations are radiological studies, there are very careful drawings which can explain to an individual, knowing very little of fractures, the exact position of the fracture with its complications, the various methods of healing, the reasons for failure of healing, the necessity for certain kinds of treatment in order to get proper alignment; period of time necessary for healing of the many different types of fractures. The many methods of immobilization, traction, internal fixation and external fixation are described and illustrated.

As a brief, complete and clear description of fractures, it is worthwhile. It is a good book for the medical student, but I can particularly recommend it for the therapist, both physical therapist and occupational therapist, and I think that it should be used either as a text or a frequent reference book for students of physical therapy and occupational therapy. *(Frances Baker, M.D.)*

ACTION OF RADIATION TISSUES. An Introduction to Radiotherapy. By *A. Lacassagne,* and *G. Gricouroff.* Cloth. Price, $6.25. Pp. 190, with illustrations. Grune & Stratton, Inc., 381 Fourth Ave., New York 16, 1958.

This monograph was originally published in 1941 to serve as a guide in radiotherapeutics for the student of this specialty. It is an adequate synthesis of radiobiologic response as observed experimentally and clinically. It is of considerable historical value as the material is largely culled from sources not available or unfamiliar to the American radiologist or oncologist.

The rapidly expanding use of ionizing radiation in the laboratory, the use of isotopes in medicine and industry, and the increasing peace-time use of atomic energy by-products on the one hand plus the enormous amount of radiobiologic research on the other hand necessitated a thorough revision of this early work. The chapters on exposure to total body radiation and genetic effects are very timely. They dispel rather convincingly the hysteria which today has become associated with lay thinking on radiation and population effect.

Emphasis is placed on the understanding of the response of normal tissues. It is this reaction which is the main limiting factor in radiation therapy of malignant disease. The inability to predict tissue response as a function of dose received reiterates the clinical lessons of the past.

The bibliography is excellent and refers to Continental as well as American reports. The illustrations are adequate. It should be a welcome addition to the libraries of anyone interested in the management of malignant tumors and will do much to indicate the limited knowledge of radiation physiology despite extensive research and clinical investigation spanning some sixty-four years. *(Otto Glasser, Ph.D.)*

REHABILITATION OF THE HAND. By *C. B. Wynn Parry*, D.Phys.Med. Cloth. Price, $9.00. Pp. 273, with 101 illustrations. Butterworth & Company, Ltd., 4-6 Bell Yard, Temple Bar, London, W. C. 2, England, 1958.

The author is a specialist in physical medicine of the Royal Air Force and therefore is working in the closest cooperation with the Royal Air Force Plastic Surgery Center. The book is quite detailed for information purposes. It starts with the functional anatomy of the hand, which means not only careful description of the anatomy and what Dr. Parry feels is the true action of all muscles, both intrinsic and long; a careful description of the sensation of the hand, which is so important in any rehabilitation program; an excellent chapter on electrodiagnosis with the basic physiology of nerve and muscle; a description of the strength duration curves; electromyography with very satisfactory illustrations. Clinically speaking, the book covers practically every pathological condition which can happen to an upper extremity and particularly to the hand, such as fractures, various contractures, infections, amputations, crush injuries, vascular impairment, hemiplegia and the like.

Brewerton has a special chapter on the rheumatoid hand and its management. Brooks authors a special chapter on reconstruction of the injured hand. Of particular interest is, throughout the book, a careful description of the rehabilitation following any of the conditions which are described, both from the standpoint of physical therapy and of occupational therapy and finally of vocational rehabilitation. A special chapter on treatment by physical therapy and occupational therapy is present — the importance of crafts, the method of crafts, the so-called scribe's position showing the use not only of pencil, but of forceps, of the handling of other fine tools, the methods by which tools can obtain various ranges of movement in the forearm and hand are all present. The so-called lively splints are well illustrated.

Any physiatrist should, by all means, have this book not only for personal benefit but for the benefit of therapists. *(Frances Baker, M.D.)*

THE CHILD WITH A HANDICAP. A Team Approach to His Care and Guidance. Edited by *Edgar E. Martmer*, M.D. Cloth. Price, $11.00. Pp. 409, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1959.

Written for students, parents, nurses, social workers, therapists, and anyone interested in the child with a handicap, this collection from 27 contributors emphasizes the team approach and places focus primarily on the child and secondarily on the handicap. A separate chapter is devoted to "the role" of each member of the team: physician, parent, psychiatrist, social worker, teacher, and adoption agency. A 25 point credo outlines the standard responsibilities the physician sets for himself in counseling the families of handicapped children. Counseling in medical genetics is a useful subject well covered even listing some of the outstanding "heredity clinics" throughout this country.

Besides covering the usual handicaps — amputations, cerebral palsy, congenital heart defect, convulsive disorders, diabetes, mongolism, progressive muscular dystrophy, nephrosis, poliomyelitis, rheumatic fever, and speech and hearing disorders; the following receive special attention: familial dysautonomia, cystic fibrosis, and emotional disturbances. In a guide for parents 18 points are listed regarding attitude, behavior, what should and should not be done, etc. A suggested reading list is given for books for parents, by parents, and about parents. Other helpful sections designated as "guides" are for discipline, play materials, reading materials, health education materials, and community programs. Resourceful information is included such as a Directory of Camps for the Handicapped, Directory of Schools, Services and Other Facilities; additional books on handicapping conditions and rehabilitation, and lists of books for children. Although this volume is not a medical text, the contributions contain a great deal of medical information and research data. *(Thomas P. Anderson, M.D.)*

ATOMIC ENERGY IN MEDICINE. *K. E. Halnan*, M.D. Cloth. Price, $6.00. Pp. 157, with illustrations. Philosophical Library, Inc., 15 E. 40th St., New York 16, 1957.

This compact volume appears in the British Atoms for Peace Series. It stresses the use of radioisotopes in the field of medicine, the importance of which is illustrated by the fact that during 1956 the United Kingdom Atomic Energy Research Establishment at Harwell alone supplied 2216 consignments of radioisotopes to medical institutions while a still larger number were supplied by the Radiochemical Centre at Amersham. The book is popularly written and does not require much knowledge of either physics or medicine. It begins with an introduction to atomic physics and a description of the principles of use of radioisotopes, method of measurement. Then follow chapters on radiobiology, and methods of cancer treatment with various types of radiation, including a teletherapy cobalt-60 unit. A rather extensive chapter is devoted to the use of radioactive iodine for the diagnosis and treatment of thyroid diseases, including scanning of the gland. Discussions of "Problems and Hazards of Radiation" and a look into the future of the use of radiation in medicine conclude the book. Thirty-one line drawings and 14 plates showing British equipment and methods supplement the text. A special and desirable feature of practically all chapters is a treatment of the historical development of the subject. Some of the statements made in these sections are not entirely correct. For example, the author states that "Roentgen soon discovered, in 1895, that they (the X-rays) were waves, like light or radiowaves — ". While it is true that Roentgen discovered X-rays in 1895, the fact that they are waves was not proved until 16 years after the discovery, by von Laue. *(Otto Glasser, Ph.D.)*

REHABILITATION AFTER ILLNESS AND ACCIDENT. Edited by *Thomas M. King*, M.D., and *C. J. S. O'Malley*, C.B.E., M.B. Cloth. Price, $3.50. Pp. 119. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore 2, 1958.

This book has a misleading title. The reviewer considers that if the present title were preceded by "The Philosophy of"; it would be more explanatory. Its principal authors write lucidly on many factors which relate to rehabilitation in general. In individual chapters they describe emotional factors, social factors and organization in rehabilitation. These chapters, together with the introduction, give a very good bird's eye view of the history, development, and the pattern formed by inter-relating disciplines of rehabilitation. However, although the principles underlying rehabilitation are fairly universal, the idiom is not. In this book all the authors are English and most of them connected with one London hospital; as a result references to purely British institutions such as I.R.U.'s, D.R.O.'s, etc. may be confusing to American readers. Other contributors to this text are responsible for chapters on rehabilitation after illness, in general medicine, in thoracic surgery, after cerebral surgery and injury, in general and orthopaedic surgery, and in occupational therapy. In order to condense so many potentially long chapters into such a short work, only the barest essentials are to be found.

It would appear then that this book should be very useful as an introduction to rehabilitation for anyone proposing to take up any of its disciplines. It would be useful for residents in physical medicine and rehabilitation, medical students, physical therapists, occupational therapists, psychologists, or social workers, to gain a broad picture of rehabilitation and see how their various disciplines were interrelated. It has insufficient detail to be of much value to a trained physiatrist, except insofar as it illustrates the part of the physician on the rehabilitation team. *(M. T. F. Carpendale, M.D.)*

THE CLOSED TREATMENT OF COMMON FRACTURES. Second edition. By *John Charnley*, B.Sc., M.B., F.R.C.S. Cloth. Price, $10.00. Pp. 260, with illustrations. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore 2, 1957.

The second edition of this work remains an excellent instructor in the practice of the author's preferred method of closed treatment, sensibly moderated by recommendations of open treatment of those fractures generally agreed to be handled better by operation.

In his preface to the second edition the author declares an intent of extending the books's purpose beyond that of a manual of practice by inclusion of a new first chapter rationalizing the superiority of the "conservative versus operative methods." In this he describes some observations, and includes a good deal of speculation about gross patterns of bone healing which together fail to be a convincing explanation of the differences noted in a comparison of healing in closed and open fracture treatment.

To readers of this journal an enlarged chapter, "Joint Movement in Conservative Methods" may prove of particular interest and may stimulate some disagreement.

CLINICAL ORTHOPAEDICS, No. 12. Edited by *Anthony F. DePalma*. Cloth. Price, $7.50. Pp. 325, with illustrations. J. B. Lippincott Company, East Washington Square, Philadelphia 5, 1958.

"Clinical Orthopaedics" is a symposium type publication under the auspices of the Association of Bone and Joint Surgeons. It claims a distinguished editorial board. This is the twelfth volume and commencing with the next edition it will be published regularly three times yearly. Rehabilitation is the theme of Volume #12, and this is covered in Section I. Section II is on General Orthopaedics. The first chapter of the book is a biography con-

cerned with the medical career of Dr. Buckminster Brown.

The section on rehabilitation has practical and timely articles on the subjects of disability evaluation, poliomyelitis, hemiplegia, paraplegia, amputee training and rheumatoid arthritis. There is an excellent review on denervation atrophy, study of which will be most helpful to all who are concerned with neuromuscular diseases. One author calls attention to the fact that the hemiplegic patient is most helpless in his early illness and that enforced bed rest aggravates this condition. He points out that the uninvolved lower extremity is called upon to perform more than usual work and undergo greater than usual stress. He emphasizes that need for attention to this segment and has developed simple and excellent technics which he terms stand up and step up exercises.

In the section on rehabilitation there is an article on the use and abuse of physical therapy in rehabilitation. The author professes a strong desire to offer constructive criticism. This article should be read by every physiatrist to determine for himself how much of this critical evaluation has application to our methods of training and to the goals of our practice. The author as evidenced by his degree is a graduate of British medicine and there may exist methods and patterns in American practice that confuse him.

The section on orthopaedics has the usual excellent articles. Particularly interesting are those on the early diagnosis and treatment of fat embolism and whiplash injuries of the cervical spine and their roentgenologic diagnosis. Under the heading of "Items" is an article on osteoarthritis of the hip in a gorilla. Three cases are described that were observed in a survey of skeletons in anatomic collections or museums. *(Charles D. Shields, M.D.)*

ESSENTIALS OF FLUID BALANCE. By *D. A. K. Black,* M.D. Cloth. Price, $3.75. Pp. 127. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1957.

This is a brief but very clear and easy to read review of the physiology of fluid and electrolyte balance and its disturbances in disease. This is followed by a discussion of the ways and means of correction of the various forms of imbalance. The therapeutic problems are handled with complete competence in presentation and advice without unnecessary and confusing details.

The monograph can be highly recommended for those who are responsibly involved in the care of acutely ill patients and those who want to refresh their basic knowledge of water and salt metabolism. *(Karl Harpuder, M.D.)*

ON THE UTILITY OF MEDICAL HISTORY, Monograph I. Edited by *Iago Galdston,* M.D. Cloth. Price, $2.00. Pp. 73. International Universities Press, 227 W. 13th St., New York 11, 1958.

This is the first of a proposed series of new monographs garnered from the proceedings of the Institute on Social and Historical Medicine, held at the New York Academy of Medicine. The avowed purpose of this Institute, according to the editor, is to determine whether medical history can illuminate current problems and issues in medicine. The six papers presented in this volume are quite general in nature and serve to convince the reader more of the learning and philosophical bent of the contributors than of the value of medical history. Perhaps they are to serve as the groundwork for more specific and convincing arguments of future monographs; if not, they will likely be of interest to only a very limited, but highly select, group of readers. *(MJD)*

AUTONOMIC IMBALANCE AND THE HYPOTHALAMUS: Implications for Physiology, Medicine, Psychology, and Neuropsychiatry. By *Ernst Gellhorn,* M.D., Ph.D. Cloth. Price, $8.50. Pp. 300, with illustrations. University of Minnesota Press, Minneapolis 12, 1957.

The author discusses at some length experimental results obtained by himself and his associates (mainly on cats) concerning the reactions of the sympathetic and parasympathetic system upon peripheral and direct hypothalamic stimulation. The blood pressure, the heart rate, the contraction of the normal and denervated nictitating membrane and sometimes respiration and visceral functions serve as parameters of autonomic activity. Gellhorn believes in separate sympathetic and parasympathetic activity and tone although he is aware of overlapping. Sympathetic activity originates in the posterior and parasympathetic in the anterior hypothalamus. The two systems show reciprocal responses. The "hypothalamus provides tonic impulses to the vascular and respiratory systems." The "downward" activity of the posterior hypothalamus is first neurogenic and later generalized sympathetic — adrenal medullary (hormonal). There is also a hypothalamic cortical discharge which results in arousal and modification of cortical activity and of the electrocorticogram. From these animal experiments deductions are made as to behavior, reactions of normal and abnormal man, various age groups and psychopathic persons. The mecholyl test is considered informative in psychology and psychiatry.

This is an interesting monograph especially for the physiologist, the experimental psychologist and psychiatrist. Whether the experimental evidence is sufficient for the conclusions is a question for the expert. Here the

scientifically minded physiatrist will find a great deal to learn and to think about. *(Karl Harpuder, M.D.)*

RECENT ADVANCES IN CEREBRAL PALSY. Edited by *R. S. Illingsworth,* M.D. Cloth. Price, $12.00. Pp. 386, with illustrations. Little, Brown and Company, Publishers, 34 Beacon St., Boston 6, 1958.

Many various problems presented by patients with cerebral palsy are included in one book by 14 well-known specialists in the United States and England. The editor is a pediatrician who, as professor of child health at the University of Sheffield, has had considerable experience in the field. Each chapter is a review of the related subject. For example, the chapter on physical therapy by Dr. W. Phelps presents brief comments on various technics of exercise used in training patients with cerebral palsy. In the opinion of Dr. Phelps there is something of value in each method.

In other chapters various authors have written on the incidence, cause, pathologic factors and diagnosis of various types of cerebral palsy, as well as on methods of testing patient's intelligence, problems of speech and hearing, use of drugs, and therapeutic neurosurgical and orthopedic procedures.

The book is an authoritative reference for all persons working with patients having cerebral palsy. It is recommended for physiatrists as well as others who are interested in physical medicine and rehabilitation for patients with this condition. *(Donald J. Erickson, M.D.)*

Applications for Prosthetist-Orthetist Training Now Being Accepted by Institute for the Crippled and Disabled

The Institute for the Crippled and Disabled in New York City has announced that it is now accepting applications for its 1959-1960 training courses for prosthetic and orthetic technicians. The nine-month courses will begin on September 14, 1959 and end on June 24, 1960.

According to the Director of the Institute's Prosthetic and Orthetic Laboratories, the content of the two courses combines academic instruction with extensive on-the-job training in the making and fitting of prosthetic and orthetic appliances. The practical experience portion of the training will take place in the brace and limb manufacturing plant of the Institute, under the direction of certified prosthetists and orthetists.

Trainees will receive additional practical clinical experience through field assignments at leading hospitals and other institutions which provide various types of services to patients wherein prosthetic and orthetic equipment is used.

To be eligible for enrollment in these courses, U. S. applicants must have a high school diploma or its equivalent. Applicants from foreign countries must have a working knowledge of the English language as spoken and written. Application forms and further information may be obtained by writing to the Director, Prosthetic and Orthetic Laboratories, Institute for the Crippled and Disabled, 400 First Avenue, New York 10, N. Y.

medical news

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before date of meeting.

Personals

: : california

=*Harvey E. Billig, Jr.,* Los Angeles was moderator of a panel on "Orthopedic Surgical Problems" May 28 at LACMA headquarters. He also presented the topic "The Fractured Hip" at the same meeting. *Charles Bechtol* of Los Angeles was a member of the panel. The topic he presented was "Neck, Head, and Arm Syndromes."

: : florida

=At the meeting of The American Board of Legal Medicine, Inc., held in Atlantic City in June, *Mortimer D. Abrashkin,* Miami Beach presented a scientific paper on "Medicolegal Aspects of Intervertebral Disk."

: : georgia

=*Robert L. Bennett,* Warm Springs, has been appointed as one of 24 distinguished physicians and scientists to an advisory committee of The National Foundation. The purpose of the committee is to counsel the Foundation on allocations of March of Dimes.

: : illinois

=On May 26, 1959, *Louis B. Newman,* Chicago, gave an illustrated lecture on "The Role of Physical Medicine and Rehabilitation in the Care of the Sick" to the faculty and administrative staff of the Department of Nursing, Chicago Wesley Memorial Hospital. Louis B. Newman addressed the Federal Hospitals Section of the Tri-State Hospital Assembly on April 28, 1959. He gave an illustrated lecture on "Physical Medicine and Rehabilitation Aspects in Total Medical Management."

=Effective July 1, 1959, *Frederick E. Vultee, Jr.,* formerly of Richmond, Virginia, was appointed associate director of the Rehabilitation Institute of Chicago.

: : minnesota

=The Minnesota State Medical Association held its 106th annual meeting in Duluth May 25-27, 1959. In the panel discussion on management of strokes, *Glenn Gullickson, Jr.,* Minneapolis spoke on the Physical Rehabilitation aspect.

=At the same meeting (Minnesota State Medical Association), *Miland E. Knapp* of Minneapolis presented a scientific exhibit on "The Handicapped Can Work."

=On May 11, 1959 at the Southwestern Minnesota Medical Society meeting in Worthington, *Kenath Sponsel,* Minneapolis spoke on "Surgery of Hand Tendon Injuries."

=At the dedication of the Gottsche Rehabilitation Center at Thermopolis, Wyoming, *Frank H. Krusen,* Rochester, was the principal speaker.

=*G. Keith Stillwell,* Rochester, participated in the National Rehabilitation Association's regional conference in Des Moines.

=On June 26, 1959, *William Kubicek,* Minneapolis presented a demonstration of research on "Studies of Cardiac Output During Rehabilitation Activities" at the Rehabilitation Center, University of Minnesota Hospitals.

: : new york

=The State Medical Society of Wisconsin, at its 118th annual meeting in May of this year heard *Anthony C. Cipollaro* of New York City speak on "Cutaneous Malignancies."

=*Robert C. Darling* of New York City participated in the Section of Physical Medicine at the meeting of the Massachusetts Medical Society, May 19-21, 1959. His subject was "The Exercise State: Its Growing Importance in Medical Evaluation and Understanding."

=The State University of New York, College of Medicine of the Downstate Medical Center on June 10 conferred the Alumni Medallion for Distinguished Service to American Medicine to *William Benham Snow* of New York City.

=*George G. Deaver,* New York City was one of the out-of-state speakers at the meeting of the Virginia Academy of General Practice, held in Richmond, Virginia at the Jefferson Hotel May 7-10, this year. His contribution was titled "The Child Handicapped by Cerebral Palsy."

=The second Louis J. Horowitz visiting professorship was recently bestowed upon *Karl Harpuder,* New York City.

=*Michael M. Dasco,* New York City, received the annual award of District 65, Retail, Wholesale and Department Store Union, AFL-CIO, for achievement in the field of welfare of the aged on May 27.

=At the annual meeting of the American Academy of Compensation Medicine held in New York in May of this year, *Donald A. Covalt* of New York City was elected president. The Academy is devoted to the diagnosis, treatment and rehabilitation of industry's sick and injured.

=Smith Kline & French has created a fellowship in physical medicine and rehabilitation for a Mexican physician to undertake postgraduate training in the United States, as announced by *Howard A. Rusk*, New York City, president of the World Rehabilitation Fund, Inc. The fellowship will provide a three-year period of training in physical medicine and rehabilitation. Dr. Rusk will be one of the visiting Sommer Lecturers at the 1959 Northwest Regional Meeting of the Academy of General Practice to be held in Portland, Oregon September 9-11.

: : oklahoma

=The Oklahoma State Heart Association has appointed *Herbert Kent* of Oklahoma City as chairman of its Cardiac in Industry and Agriculture Committee. Dr. Kent has also been appointed to the committee on the Health Care of the Aged of the Oklahoma State Medical Association.

: : pennsylvania

=At the annual meeting of the American Board of Legal Medicine, Inc., *Harold Lefkoe* of Philadelphia presented a paper on "Back Pain and Retarded Healing."

: : wisconsin

=*Edwin Welsh* of Wood spoke on the following subject at the annual meeting of the State Medical Society of Wisconsin, May 5-7, 1959: "Role of the Physiatrist in Amputations and Rehabilitation Facilities Available in Wisconsin."

Recent Publications by Members

The following papers were published in the Journal of Chronic Diseases:

William A. Spencer and co-author, "The Total Lung Capacity and Its Subdivisions in Respiratory Poliomyelitis"; June, 1959.

Douglas Carroll and co-author, "Survey of 230 Medical Patients in the Baltimore City Chronic Disease Hospital"; June, 1959.

Jack Sokolow and co-author, "The Effect of Iproniazid on the Rehabilitation of Disabled Persons with Low Motivation"; July, 1959.

H. Frazer Parry, "Comparative Heating Techniques"; The Pennsylvania Medical Journal, June, 1959.

A. T. Richardson, "Pain in the Foot and Heel"; Annals of Physical Medicine, May, 1959.

Leonard F. Bender and co-authors, "A New Prosthetic Multiple Action Shoulder Unit"; The American Journal of Occupational Therapy, May-June, 1959.

Kenneth Phillips, "Clinical Studies on Hypoglycemic Syndrome"; American Practitioner Digest of Treatment, June, 1959.

A. B. C. Knudson, "Educational Therapy Principles"; American Archives of Rehabilitation Therapy, June, 1959.

E. T. Edwards, "Medical Benefits and Health Insurance"; The Journal of the Indiana State Medical Association, March, 1959.

The following papers were published in Minnesota Medicine:

Gordon M. Martin, "Physical Therapy in the General Practitioner's Office"; March, 1959.

Robert W. Boyle, "The Physical Treatment of Peripheral Nerve Injuries"; April, 1959.

Howard A. Rusk, "Health for Peace"; The New Physician, May, 1959.

J. L. Rudd and co-author, "Medical and Vocational Co-operation for the Ageing"; Physiotherapy, May, 1959.

The following papers were published in The Physical Therapy Review, May, 1959:

Ben L. Boynton and co-authors, "Observations on the Effects of Cool Baths for Patients with Multiple Sclerosis."

Robert D. Kruse, "Current Trends and Practices in Physical Therapy."

Abraham Vinograd, "Exercise in Vascular Disorders"; Cyclopedia of Medicine, Surgery and Specialties, April, 1959.

Ernest W. Johnson and co-author, "Planning Community Programs for Cerebral Palsy Patients"; The Ohio State Medical Journal, May, 1959.

Howard A. Rusk, "The World Rehabilitation Fund"; Bulletin, Prostheses, Braces and Technical Aids, Spring, 1959.

A. T. Richardson, "Pain in the Foot and Heel"; Annals of Physical Medicine, May, 1959.

Anthony C. Cipollaro, "The Present Status of Dermatologic X-Ray Therapy"; Illinois Medical Journal, June, 1959.

Herman Kabat and co-authors, "The Practical Application of Proprioceptive Neuromuscular Facilitation"; Physiotherapy, April, 1959.

The following papers were published in The Journal of the American Medical Association:

Howard A. Rusk and co-author, "Functional Fashions for the Physically Handicapped"; April 4, 1959.

Leon Lewis and co-authors, "Application of Abdominal Pressure for Artificial Respiration;" April 4, 1959.

Eugene Moskowitz, "Aged Infirm Residents in a Custodial Institution"; April 25, 1959.

Howard A. Rusk and co-authors, "The Candidate for Coronary Heart Disease"; May 9, 1959.

Newly Registered Therapists

April 15, 1959

Medical College of Virginia

Becraft, Joan E., 1544 W. Falkland Lane, Silver Spring, Md.

Dupree, Ruth Anne, 4349 N. Pershing Dr., Arlington, Va.

New York University

Adar, Uriel, c/o Thomas, 546 W. Broadway, New York City

Vistocco, Dominic R., 100 W. 76 St., New York City

May 7, 1959

Medical College of Virginia

Steeves, Joan, Evans House, Mountainside Hospital, Montclair, N.J.

Northwestern University Medical School

Stoudt, Carol M., 1526 Pratt Blvd., Chicago

June 9, 1959

Medical College of Virginia

Dunn, Patty H., c/o PT Dept., McGuire VA Hospital, Richmond, Va.

Newcome, Doris A., PO Box 224, Fairfax, Va.

University of Southern California

Goldstein, Dorit B., 3420 W. 9th St., Los Angeles

June 17, 1959

University of Kansas Medical Center

Benjamin, Carol Ann, RR #3, Monticello, Ind.

Goodman, Jack G., 317 Anthony St., Fredericktown, Mo.

Stanek, Donald W., 5659 N. Northwest Hwy., Chicago

Northwestern University Medical School

Nanninga, Leah R., 609 10th Ave., Lewiston, Idaho

Williams, Jean C., Triangle Terr., Elloree, S. C.

July 3, 1959

Washington University School of Medicine

Barrett, Martha L., 315 Elm St., Marietta, Ohio

Blankenship, Nancy L., 304 Rolling Hills Ave., San Mateo, Calif.

Cole, Sara R., Dar School, Tamassee, S. C.

Feldman, Ann, 1038 S. Main St., St. Charles, Mo.

Henney, Nancy K., 1115 "G" St., Fairbury, Neb.

Jacobson, Janice C., 3205 Prairie Ave., Mattoon, Ill.

Rosenberger, Gregory C., 1607 Monroe Ave., Evansville, Ind.

Teague, Patricia S., 410 E. Tate, Brownfield, Texas

July 15, 1959

Boston University, Sargent College

Unger, Julianna S., 63 S. Lake Dr., Hackensack, N.J.

University of Buffalo

Calkins, Ann B., 929 Smith St., Buffalo

Callanen, Judith R., 123 Sanger Ave., Waterville, N.Y.

Columbia University College of Physicians and Surgeons

Gillespie, Sarah O., Pounding Mill, Va.

Slohn, Sarah E., 1724 S. Dale Mabry, Tampa, Fla.

University of Minnesota

Anderson, Marylin R., 7421 Lyndale Ave., S., Minneapolis

Anderson, Karen J., Lenwood Rd., Rt. 3, Excelsior, Minn.

Fuchigami, Dave Y., 2321 Palena St., Honolulu, Hawaii

Gregerson, Katherine, 3427 Irving Ave., S., Minneapolis

Koep, Janell C., Lakefield, Minn.

Larson, Richard D., RFD #3, Pelican Rapids, Minn.

Manders, Sandra Jean, 2001 Adolphus St., St. Paul

Oslund, Patricia J., 1911 Pillsbury Ave., S., Minneapolis

Peters, Ruth E., Peter's Hotel, Glenwood, Minn.

Robinson, Carol P., 40 Coleridge Rd., Calgary, Alta., Canada

Wellenstein, Mary K., Ponca, Neb.

Wessman, Henry C., 822 N. Main, Crookston, Minn.

St. Louis University

Averill, Margaret L., 930 Cella Rd., Clayton, Mo.

Early, Ann Marie, 3005 Lafayette Ave., St. Louis

Hertel, Dorothy M., 41 E. 214 St., Euclid, Ohio

La Mure, Margaret C., 1200 Hickory St., St. Louis

McCloskey, Mary Ann, 900 S. Main St., Fort Branch, Ind.

Spala, Helen M., 3152 S. Compton Ave., St. Louis

Books Received

Books received are acknowledged in this column as full return for the courtesy of the senders. Reviews will be published in future issues of the journal. Books listed are not available for lending.

DECEASED MEMBERS

DR. HENRY J. AUSTIN

Henry J. Austin, Trenton, New Jersey died on January 25, 1959 at the age of 70. Dr. Austin was graduated from Howard University College of Medicine, Washington, D. C., in 1919; he was a member of the American Academy of General Practice, and a veteran of World War I. He served as school physician in Trenton for 35 years and was secretary-treasurer of the New Jersey Society of Physical Medicine and Rehabilitation.

DR. LEON R. BURNHAM

Leon Ray Burnham of Augusta, Maine died on January 21, 1959 at the age of 52. Dr. Burnham was a graduate of Tufts College Medical School, Boston, 1930; and a veteran of World War II. He was Chief of Physical Medicine and Rehabilitation at the VA Center in Togus, Maine.

DR. HEINRICH F. WOLF

Heinrich Franz Wolf, New York City, succumbed to a heart attack on May 12, 1959 while vacationing in Seville, Spain. Dr. Wolf was born on September 23, 1872 in Austria. He received his M.D. degree at the German University of Prague in 1897. Dr. Wolf was a Diplomate of the American Board of Physical Medicine and Rehabilitation; of the New York Academy of Medicine; past president and member of the New York Society of Physical Medicine.

(Continued from page 366)

The Degenerative Back and Its Differential Diagnosis by P.R.M.J. Hanraets; **Orthopedic Nursing Procedures** by Avice H. Kerr; **The Posture Problem Up to Date** by May Goodall Darrow; **A Textbook of Medicine** edited by Russell L. Cecil and Robert F. Loeb; **Orthopaedics: Principles and Their Application** by Samuel L. Turek; **Rehabilitation Centers Today** by Henry Redkey; **Medicine and Anthropology** edited by Iago Galdston; **Care of the Patient with a Stroke** by G. W. Smith; **On the Mysterious Leap from the Mind to the Body** by Felix Deutsch; **The Management of Fractures and Dislocations, Vols. I and II** edited by Anthony F. DePalma; **1959 Current Therapy** edited by Howard F. Conn; **Practical Dermatology** by George M. Lewis; **Therapeutic Electricity and Ultraviolet Radiation** edited by Sidney Licht; **Electrocardiography** by Michael Bernreiter; **Progressive Exercise Therapy** by John H. C. Colson; **Re-Education of the Injured Shoulder** by R. Barrie Brookes; **Applied Anatomy and Physiology for Orthopaedic Nurses** by Joyce W. Rowe and Victor W. Wheble; **The Child with a Handicap** edited by Edgar E. Martmer; **Annual Review of Medicine, 1959, Vol. 10** edited by David A. Rytand; **More About the Backward Child** by Herta Loewy; **Electromyographie dans les Maladies Nerveuses** by N. Rosselie; **Right-Left Discrimination and Finger Localization: Development and Pathology** by Arthur L. Benton; **Give Us the Tools** by Henry Viscardi, Jr., **Handbook of Diet Therapy, third edition** by Dorothea Turner; **Lehrbuch Der Krankengymnastik** by K. Lindemann, H. Teirich-Leube and W. Heipertz; **Clinical Orthopaedics Volume 13 Part I: The Hand** edited by Anthony F. DePalma; **Vocational Rehabilitation for the Physically Handicapped** by Louise M. Neuschutz; **Insulin Treatment in Psychiatry** edited by Max Rinkel and Harold E. Himwich; **The New Psychiatry** by Nathan Masor; **Anatomy and Physiology Volume 1** by Edwin B. Steen and Ashley Montagu; **Nutrition and Atherosclerosis** by Louis N. Katz, Jeremiah Stamler and Ruth Pick; **Rehabilitation in Industry** edited by Donald A. Covalt; **Surgery of the Foot** by Henri L. DuVries; **Metals and Engineering in Bone and Joint Surgery** by Charles O. Bechtol, Albert B. Ferguson, Jr., and Patrick G. Laing; **Memorandum Des Sports** by H. J. Styns and E. Vanden Eynde.

Kenny Foundation Scholarships

The Sister Elizabeth Kenny Foundation announces continuation of its program of post doctoral scholarships to promote work in the field of neuromuscular diseases. These scholarships are designed for scientists at or near the end of their fellowship training in either basic or clinical fields concerned with the broad problem of the neuromuscular diseases.

The Kenny Foundation Scholars will be appointed annually. Each grant will provide a stipend for a five-year period at the rate of $5000 to $7000 a year, depending upon the scholar's qualifications. Candidates from medical schools in the United States and Canada are eligible.

Inquiries regarding details of the program should be addressed to: Dr. E. J. Huenekens, Medical Director, Sister Elizabeth Kenny Foundation, Inc., 2400 Foshay Tower, Minneapolis 2, Minn.

Congress Members Participate in AMA Meeting

At the 108th annual meeting of the American Medical Association held in Atlantic City June 8-12, 1959, the following Congress members were delegated as officers of the Section on Physical Medicine: Chairman, Arthur L. Watkins, Boston; Vice-Chairman, Lewis A. Leavitt, Houston, Texas; Secretary, Earl C. Elkins, Rochester, Minnesota; Delegate, Walter J. Zeiter, Cleveland; Representative to Scientific Exhibit, Harold Dinken, Denver. The Executive Committee consisted of Miland E. Knapp, Minneapolis, Arthur L. Watkins, Lewis A. Leavitt, Earl C. Elkins and Walter J. Zeiter. Speakers and their subjects follow: Arthur L. Watkins, Chairman's Address: "Vocational Evaluation and Rehabilitation in a General Hospital;" G. Keith Stillwell "Physical Medicine in the Management of Postmastectomy Lymphedema;" Paul A. Nelson "Management of Patients with Edema of the Extremities;" Grace M. Roth, Earl C. Elkins "Sweating Patterns and Skin Temperature Measurements on Patients with Spinal Cord and Brain Lesions;" Lewis A. Leavitt "Industrial Therapy: Its Role in a Complete Rehabilitation Program;" Harry T. Zankel "Iontophoresis: Physiological Basis, Indications and Technique;" William Bierman, Gregory Bard, Miland E. Knapp, William D. Paul, Edward P. Reese and Sol Winokur "European Spas;" Kenneth C. Archibald "Leg Bracing in Hemiplegia;" Jerome S. Tobis "A Physiatrist's Approach to Asphasia;" Mieczyslaw Peszczynski "Evaluation of the Functioning of the Hemiplegic Patient;" Keith C. Keeler "The Knee: A Problem in Physics;" F. J. Kottke "The Use of Constant Tension Springs on Long Leg Braces to Assist the Function of the Quadriceps Femoris;" Ernest W. Johnson "Clinical Value of Motor Nerve Conduction Velocity Determination;" Bror S. Troedsson "Oscillometric Arterial Circulatory Norms. Their Value and Reliability in Localizing the Level and Extent of Occlusion in Arteriosclerosis Obliterans of the Lower Extremities;" A panel discussion on the subject "Can There be Overwork of the Neuromuscular Mechanism by Therapeutic and/or Other Exercise?" had Arthur L. Watkins as moderator and the following on the panel: Robert L. Bennett, O. Leonard Huddleston, G. Clinton Knowlton and Miland E. Knapp.

In the Section on Orthopedic Surgery, the following member participated: Charles S. Wise, "Immediate Treatment of Shoulder Injuries."

Course in Rehabilitation Care of the Chronically Ill Patient

A one-week course for physicians, devoted to the rehabilitation care of the chronically ill patient, will be held November 16-20, 1959 under the auspices of the Department of Physical Medicine and Rehabilitation, New York Medical College — Metropolitan Hospital Center. The course will offer a review of the principles and technics in the medical care of the chronically ill to meet the needs of the clinician, medical administrator and public health physician. Course content will include physiology and pathology of chronic diseases, nutrition and dental care, management of bedridden and incontinent patients, home care programming, community needs and resources, public health aspects, self-care activities, prosthetic devices and psychological and social aspects.

The tuition fee is $100.00. Traineeships for tuition, maintenance and travel are available through funds provided by the U. S. Office of Vocational Rehabilitation. Applications for the course and traineeships can be obtained directly from Dr. Jerome S. Tobis, Chairman, Department of Physical Medicine and Rehabilitation, New York Medical College, 1 East 105th Street, New York 29, N. Y.

World Confederation for Physical Therapy

The Third International Congress of The World Confederation for Physical Therapy will be held in Paris, France, September 6-12, 1959.

The theme of the Congress is "Physical Therapy — Its Importance in Human Economic and Social Development" with emphasis on Neurology, Geriatrics, Orthopedic Surgery and Traumatology, Rheumatology, Heart and Chest Conditions, Aids and Prostheses, and Psychiatry.

Further information may be obtained from the American Physical Therapy Association, 1790 Broadway, New York 19, N. Y.

State Examination for Physical Therapists

The Connecticut State Board of Examiners for Physical Therapists' Examination for Licensure of Physical Therapists is scheduled for Wednesday, October 14, 1959.

Closing date for completed applications is Monday, September 14, 1959.

Contact Miss Sarah C. Johnson, R.P.T., Secretary-Treasurer, 436 Capitol Avenue, Hartford, Connecticut.

DR. FRANK H. KRUSEN RECEIVES APPOINTMENT

FRANK H. KRUSEN, M.D.

Dr. Frank H. Krusen, who founded the Section of Physical Medicine and Rehabilitation of the Mayo Clinic in 1935, has been appointed special assistant for health and medical affairs to the director of the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare, it is announced by Arthur S. Flemming, Secretary of Health, Education, and Welfare, Washington, D. C. Dr. Krusen will assume the new post on or about September 15, 1959, but on the basis of a leave of absence for 3 months from the Mayo Clinic, and he will remain a member of the staff of the clinic.

The duties involved in the post of special assistant to the director of the Office of Vocational Rehabilitation are to advise the director on long-range medical programs, policies and plans related to the current and expanding rehabilitation plans of that office. Dr. Krusen will work with leading medical groups in interpreting the objectives of vocational rehabilitation programs, and will maintain liaison with national and international voluntary agencies which have a mutual interest in rehabilitation to promote a co-ordinated approach to the development of medical and related services for the disabled.

He will also maintain a liaison with members of U. S. Congress and Congressional committees to interpret objectives of programs, and will consult periodically with the chairman of the National Medical Advisory Committee on policies and programs in medical fields related to rehabilitation. An important responsibility will be to collaborate with the Public Health Service of the United States toward establishment of an intramural research program in medical rehabilitation at the National Institutes of Health Clinical Center in Bethesda, Maryland. Dr. Krusen also will maintain over-all liaison with the Public Health Service in matters of medical rehabilitation.

Dr. Krusen, who is also professor of physical medicine and rehabilitation in the Mayo Foundation, Graduate School, University of Minnesota, has been president of every major national and international professional organization devoted to his special field. In 1954, President Dwight D. Eisenhower conferred upon him the Physician's Award for outstanding contributions to the employment and welfare of the physically handicapped, and in 1958, the House of Delegates of the American Medical Association conferred upon him the Distinguished Service award of that organization. In the same year Secretary of Health, Education, and Welfare Marion B. Folsom appointed him to the National Advisory Council on Vocational Rehabilitation.

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PHYSICAL THERAPIST

New York Polyclinic Medical School and Hospital expanding physical medicine and rehabilitation department. General rehab problems. Good salary with increments, sick leave, paid vacations, apply Personnel Office, 345 W. 50th St., New York 19, N. Y. CO. 5-8021.

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